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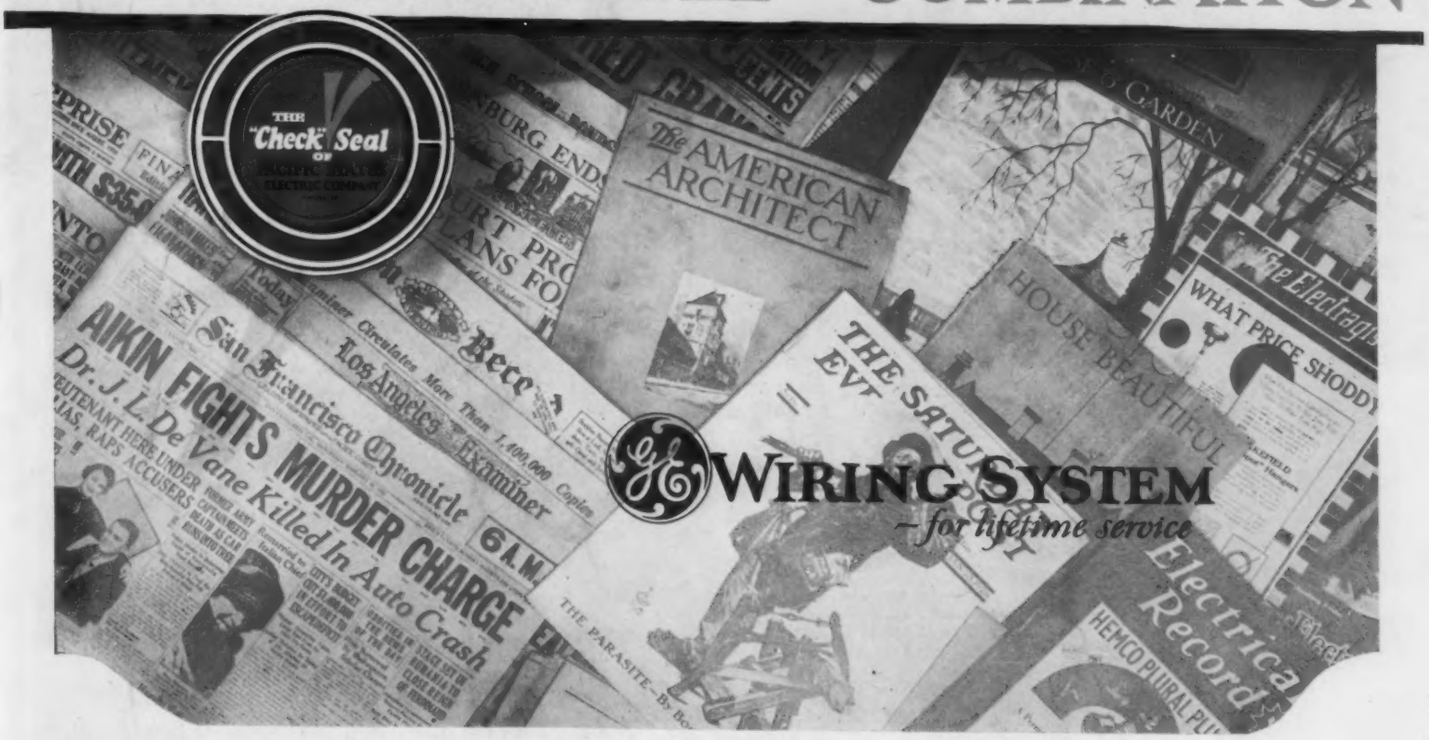
Journal of Electricity

Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES

AN IRRESISTABLE COMBINATION



During 1926—"Check" Seal Electrical Contractors and Retailers will receive the double-barrelled support of two well planned intensive advertising campaigns. Read further details on pages 4 and 5 of this issue.

PACIFIC STATES
ELECTRIC COMPANY

Merchandise Distributor
GENERAL ELECTRIC

Announcing the Wonderful New-
Hotpoint Super-Iron

MARVELOUS NEW ELECTRIC IRON DEVELOPED

California Manufacturer Perfects An Electric Heating Element Cast In Solid Iron

For years the engineers of the Edison Electric Appliance Company have been endeavoring to perfect an electric heating element which would attain higher efficiency and be practically indestructible. The result is "Hotpoint Calrod" element.

For several years this new element has been subjected to the most strenuous service known and has demonstrated its durability; for instance in commercial laundry irons, where each year's use is equal to over 20 years in the average household.

Now Hotpoint Calrod heating element is being incorporated in the new Hotpoint Super-Iron. The Calrod element is cast in the solid iron heat reservoir at 2250° Fahrenheit (molten iron). The fact that Hotpoint Calrod element stands this terrific heat without damage is the best indication that it will not be harmed by the most extreme temperature condition arising in service. Moreover the element is forever sealed in and protected against damage.

This new box will look attractive on your shelves. Wonderfully improved, but no advance in Price.

Only $6

Cut-away view showing Patented Hotpoint Calrod. Cast in solid iron heat reservoir of the Hotpoint Super-Iron.

The Most Popular Iron made even Better

The New Hotpoint Super-Iron with the Patented Hotpoint Calrod Heating Unit provides the greatest talking point in the sale of electric irons made available for the dealer in 22 years.

Dealers carrying the New Hotpoint Super-Iron NOW will cash in on the eleven million messages to the public appearing in Hotpoint advertisements within a period of 35 days.

Back up this publicity with window displays and newspaper advertisements. The desire to own a Hotpoint Super-Iron will come to thousands in your community. Stock up now with the New Hotpoint Super-Irons and get your share of the profits which can be obtained.

EDISON ELECTRIC APPLIANCE CO., Inc.
Pacific Coast Headquarters and Factory, Ontario, Calif.
LOS ANGELES · SAN FRANCISCO · PORTLAND · SEATTLE
SALT LAKE CITY · CHICAGO · BOSTON · NEW YORK
ATLANTA · CLEVELAND · ST. LOUIS
In Canada, Canadian General Electric Co., Ltd., Toronto
5620 West Taylor St., Chicago, Ill.

Hotpoint
SERVANTS

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Other Hotpoint Advantages

Hotpoint's Patented Thumb Rest

An exclusive Hotpoint feature. You can never know how much this rests your wrist, arm and shoulder until you use it. Go to your nearest dealer's and try it for yourself.

So great has been the demand for this comfort feature that it is now made even for left-handed women.

Hotpoint's Exclusive Hinged Plug

As you iron, the cord swings and tends to bend at the plug. Sometimes it pulls taut. In the Hotpoint Super-Iron plug the hinge bends instead and saves the cord. Inside the plug a special fitting prevents any pull or jerk from loosening the connections. Even the weight of the iron falling from the ironing board will not pull the wires loose from the connections in the plug.

Hotpoint's Heel Stand

Lifting an ordinary iron on and off its stand 150 times during an ironing is equivalent to lifting almost a ton. With the Hotpoint, you merely tilt it back on the heel stand anywhere on the board—then tilt it forward again and continue ironing.

ILLUSTRATED BELOW ARE SOME OF OUR PRODUCTS USING PATENTED HOTPOINT CALROD HEATING ELEMENTS

HOUSEHOLD RANGES · TABLE STOVES · PERCOLATORS · CURLING IRONS · WAFFLE IRONS · WATER HEATERS · HOUSEHOLD RANGES

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IN THE ELEVEN WESTERN STATES

A McGraw-Hill Publication

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Contents

Editorial 77

During 1925 Central-Station Construction Exceeds Any Previous Year 79

A resume of the accomplishments of the power companies in the eleven Western states.

West Leads United States in Power Development 88

Results of a survey of the operations of the Western power companies for the year 1925.

The Industrial Load of the West 90

A nation-wide industrial survey reveals the fact that the manufacturing plants of the West are 65 per cent electrified and that the central stations furnish 79.3 per cent of the energy consumed by them.

Electric Refrigeration Activity Will Mark Merchandising in 1926 100

Plans of sales executives of the Pacific Coast power companies indicate electric refrigeration will play an important part in their 1926 programs.

Report Shows 280,000,000 Lamps Sold During 1925; Many Improvements 89

Ideas for the Contractor 108

News of the Industry 112

News of the Electragists 118

Meetings 119

Book Reviews 119

Personals 120

Trade Notes 121

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Statistical Chart Reprints to Be Available

FEW issues of any technical publication contain so graphic a picture of the development of the electrical industry as is contained in the carefully and elaborately prepared statistical tables published in this issue. It goes without saying that these tables are of great value to those interested in electrical development, whether from an engineering or from a commercial standpoint.

To make these tables available to those who might prefer them in a concentrated leaflet, convenient to carry about or file, the Journal of Electricity is planning to make reprints of them, which may be obtained by writing to the offices of this publication.

Reprints of the tabular matter contained in this issue, dealing with the construction in hydroelectric and steam plants and transmission lines will be available as one group. These are the tables which appear on pages 80 and 81, showing the additions to the hydroelectric generating plants in the eleven Western states, 1925-1926; those containing the additions to the steam generating plants in the eleven Western states, 1925-1926, pages 82-83, as well as the table showing the additions to the transmission systems in the eleven Western states, 1925-1926, on pages 86 and 87.

The surveys of the industrial load, also in graphic tabular form, likewise will be available as reprints.

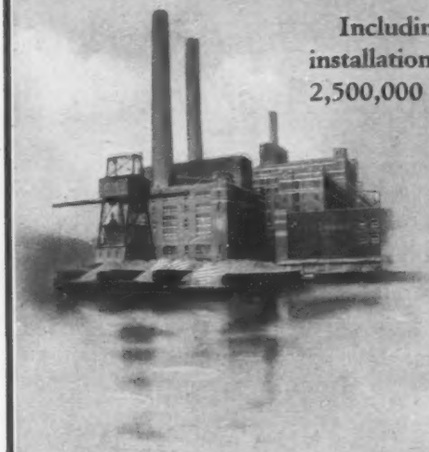
Those wishing copies of these reprints may address their requests to the Journal of Electricity, 883 Mission Street, San Francisco, where prices for the reprints and other details concerning them will be furnished gladly.

BURNING ALL KINDS OF FUEL

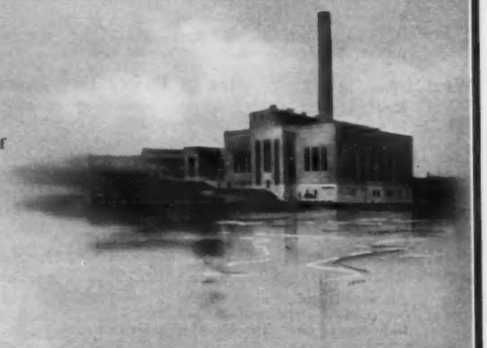
POWER stations making records for economy with all kinds of fuel are among recent Stone & Webster work. They include stations with stokers burning a wide range of coals, and stations burning pulverized fuel, oil, and natural gas. Some of the coal burning and some of the oil-burning stations are designed for changing at any time to pulverized fuel. Where gas is burned the stations permit changing to oil or pulverized fuel. This Stone & Webster experience covering conditions in all parts of the country and with all kinds of fuels is offered to those contemplating new plants or extensions.

Including the plants here shown, Stone & Webster installations for industry and the public utilities exceed 2,500,000 horse power.

RIVER-DREDGED ANTHRACITE
American Sugar Refining Company, Baltimore, Md.

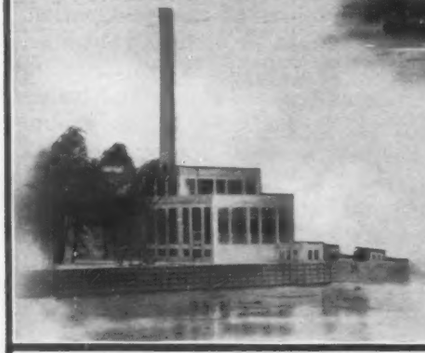


OIL
(or Pulverized Fuel)
Montaup Electric Company, Fall River, Mass.

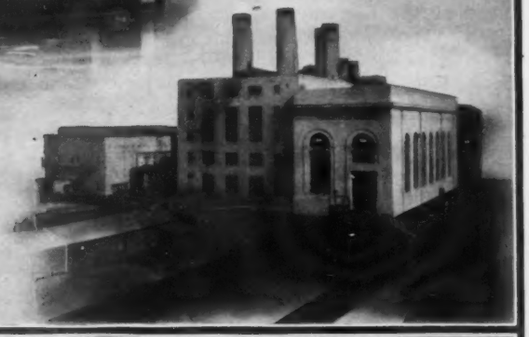


BITUMINOUS COAL
The Edison Electric Illuminating Co. of Boston,—Edgar Station.

PULVERIZED FUEL
Ford Motor Company, St. Paul, Minn.



NATURAL GAS (or Oil)
Southern California Edison Company, Los Angeles, Cal.—Long Beach Station.



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EDITORIAL

Progressing Toward the Goal

WERE Horace Greeley speaking of electrical development when he admonished the youth of the country to turn their steps westward he might well have said, "Look West," for in those states on the Pacific side of the Rockies electricity is king. With but eight per cent of the population, central stations of the eleven Western states today have 14.3 per cent of the total central-station consumers and 14 per cent of the wired homes of the country; they generate 19.5 per cent of the country's electric energy and 45 per cent of the total energy produced by hydro plants. Western industry is 65 per cent electrified, the highest proportion in the United States, and central stations supply approximately 80 per cent of the electric energy consumed in industrial plants in this section.

DESPITE such a record of accomplishment, there is no tendency on the part of the electric light and power industry of this section to allow its vision to become impaired or to rest on its oars. Rather its mind is intent on the bigness of its present job and the possibilities of the future. This is evidenced by the fact that during the year just closed the program of central station construction was the greatest in the history of the industry. Western central stations during 1925 added 401,125 kva. to the installed capacity of the generating plants and have mapped out a program of construction in keeping with the unprecedented growth of this territory.

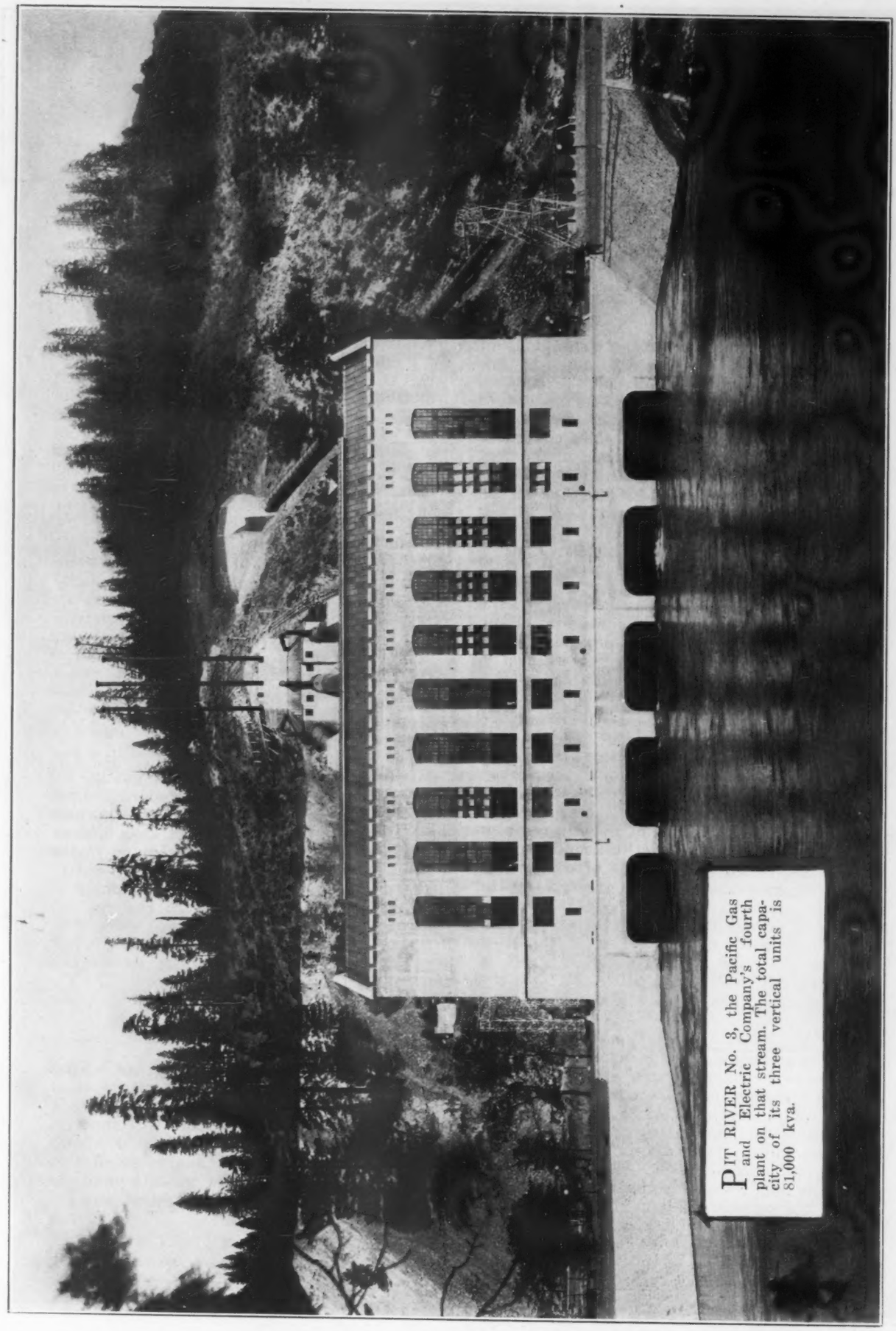
WHILE the wave of general prosperity was responsible for an increase in the number of consumers and a greater use of electric energy, companies were not content with natural growth alone, but undertook extensive commercial department campaigns which included every type of load-building device and every class of consumer. To cite one accomplishment in this direction, the number of domestic cooking consumers increased 40 per cent during 1925.

HOWEVER, the greatest development of a commercial nature during this year was the awakening to realization on the part of those California companies which for years have abstained from merchandising any device smaller than electric range or water heater, that building a domestic load is a power-company job. One commercial executive aptly states this new position in the following words:

> This company is firmly convinced of the correctness of the policy of central-station merchandising provided it is done on a proper basis. There can be no argument as to the desirability of placing appliances and lighting load on the line of any company, for it produces additional revenue with very little, if any, capital expenditure. The placing of this additional load is strictly a central-station job, for we cannot expect any other agency to have the same interest in it as we should have, as they do not have the same incentive.

FROM a public-relations standpoint the efforts of the Western companies have not lagged. More and more customer-owners have been added to the list of stockholders. There has been a greater awakening to the value of the work of women in the industry and women's committees are functioning in nearly every state. Although the political horizon shows signs of a renewed storm during the fall, especially in California, Oregon and Washington, plans are being worked out which, it is hoped, will still for all time the voice of the political proponents of state ownership.

SO, with a new year under way, the central stations of the West have placed their shoulders to the wheel, intent upon the task of proving to the public that electricity is the cheapest and most useful agent known to mankind and that it has achieved this distinction under the wise guidance and energetic efforts of private initiative and enterprise.



PIT RIVER No. 3, the Pacific Gas and Electric Company's fourth plant on that stream. The total capacity of its three vertical units is 81,000 kva.

During 1925 Central-Station Construction Exceeds Any Previous Year

POWER companies of the eleven Western states added 401,125 kva. in new capacity to their systems during 1925 as against 382,723 kva. in 1924. Construction budget for 1926 is estimated to be $153,450,000. Transmission-line construction exceeded any previous year with 1,865.9 miles of new lines, ranging between 30 and 220-kv., completed or under construction.

CENTRAL - STATION power-plant construction during 1925 has been responsible for the addition of 401,125 kva. to the installed generator rating of the eleven Western states, bringing the total as of Jan. 1, 1926, to 3,368,723 kva., or a growth of 13.5 per cent for the year. Of the increase for the past year 314,625 kva. was in hydroelectric plants and 87,500 kva. in steam electric stations. The increase for the year compares with 382,723 kva. installed during 1924. The total power-company construction budget for the year is estimated to have been $127,610,000, of which $74,250,000 was spent for power-plant construction, $15,660,000 for new transmission lines and $37,700,000 for distribution facilities.

From present indications 1926 will fall somewhat below 1925 in total capacity added although there will be more construction in process. Study of projects under way at the present time shows that approximately 339,550 kva. will be installed during the present year with 194,550 kva. in hydro plants and 145,000 kva. in steam plants. The 1926 construction budget is estimated to be $153,450,000, the increase over 1925 being due largely to increased expenditures for transmission and distribution facilities. Not less than $29,300,000 will be spent on new transmission lines during the year and $42,200,000 on new distribution facilities.

Briefly summarized, the construction program for the central stations of the eleven Western states for the five-year period of 1922-1926, inclusive, is shown in the following table:

Year	Hydro (kva.)	Steam (Kva.)
1922	138,675	No record
1923	185,500	No record
1924	243,223	139,500
1925	314,625	87,500
1926	194,550	145,000
Total steam and hydroelectric		1,448,573 kva.
Average per year for five-year period		289,714 kva.

The major portion of the new hydro capacity is in five large new plants with the balance comprising new units in three existing plants, together with four small plants, two of which were rebuilt. The most important project of the year was the Pacific Gas and Electric Company's new 81,000-kva. Pit No. 3 plant in Northern California (see Journal of Electricity, Aug. 15, 1925, pp. 119-137). This company is going ahead with work on its Pit No. 4 power house, having started construction of the necessary tunnels during the past year.

Next in importance among the new hydro generating stations is the Moccasin power house of the City of San Francisco with an installed capacity of 80,000 kw. (Journal of Electricity, July 1, 1925, pp. 25-30). This plant was placed in operation in August 1925, after an unfortunate penstock break which incapacitated the station for several weeks Since that time, however, it has been operating highly satisfactorily, its output being distributed over the lines of the Pacific Gas and Electric Company.

A third California development of importance is the 30,000-kw. Copco No. 2 plant of The California Oregon Power Company on the Klamath River in northern California (Journal of Electricity, Nov. 15, 1925, pp. 365-371). This plant is the second of a chain to be constructed on that stream. A portion of its output is being distributed in California by the Pacific Gas and Electric Company.

The remaining hydro construction of any importance in California completed during the year was the installation of additional units in two of its Big Creek plants by the Southern California Edison Company. A 25,000-kw. unit was placed in operation in Big Creek No. 1, bringing the capacity of that station to its ultimate of 73,000 kw. An additional 16,000-kw. unit also was installed in Big Creek No. 2, bringing the capacity of that station to 64,000 kw.

In the Pacific Northwest the Puget Sound Power & Light Company completed its Baker River plant which has an installed capacity of 39,000 kva. (Journal of Electricity, Dec. 15, 1925, pp. 440-451). The plant was constructed to serve the northern district of that company's territory, and as a result of its construction a territory which was partially served with energy purchased from Canada now is served with energy generated by the company.

Another important Northwest development is the 12,500-kw. Mystic Lake plant of the Montana Power Company which involves several unique features (Journal of Electricity, Jan. 15, 1926, pp. 43-49). This development is unusual because it

Some Additions to Hydroelectric Generating Pl

	COMPANY	PLANT	LOCATION	DAMS			CANALS AND TUNNELS			PENSTOCKS		
				Type	Reservoir Capacity (Acre-ft.)	Height (Ft.)	Type	Dia. (Ft.)	Length (Ft.)	Dia.	Length (Ft.)	Type
(1)	British Columbia Electric Railway Company, Ltd.	Stave Falls (Fifth Unit)	Stave Falls, B.C.	Concrete	471,000	75	.....	.....	.....	20–13′	324	Rivtd.
(2)	British Columbia Electric Railway Company, Ltd.	Alouette	35 Mi. east of Vancouver	Earth Fill	170,000	63	Tunnel	12x16	3,550	13′ 12′	.....	Coner. Rivtd.
(3)	British Columbia Electric Railway Company, Ltd.	Bridge River	Seton Lake, B.C.	.....	.....	.....	.....	13	13,200	.....	2,100	.....
(4)	The California Oregon Power Company	Copco No. 2	Klamath River, Calif.	Gravity	.....	34	Tunnels Wd. Pipe	16 16	3,545 1,318	13½′	403	Rivtd.
(5)	Chelan Electric Co.		Lake Chelan	.....								
(6)	City of San Francisco	Moccasin	Tuolumne River, Calif.	Gravity Arch	206,000	344	Concrtd. Tunnel	10¼ 13½	18.8 miles	104″ 54″	....	Rivtd. Weld.
(7)	City of Seattle	Ruby	Skagit River, Wash.	Arch	1,300,000	480	Concrtd. Tunnel	28	18,500	.....		
(8)	City of Tacoma	Cushman No. 1	Lake Cushman, Wash.	Constant Angle Arch	450,000	285	Concrtd. Tunnel	17	800	10′	80	Rivtd.
(9)	City of Tacoma	Cushman No. 2	Lake Cushman, Wash.	Constant Angle Arch	6,000	180	Concrtd.	.....	9,000	.....		
(10)	Feather River Power Company	Buck's Creek	Feather River	Rock Fill 2-Arch	103,000	115 85	.....	6x8 8x8	5,700 9,670	54″ 36″	4,715	Rivtd. Weld.
(11)	Great Western Power Company	Caribou (Fourth Unit)	Feather River, Calif.	Hydraulic Fill	1,300,000	45 Addtl.	*	*	*	66–42″	.....	
(12)	Inland Power & Light Company	Lewiston	Lewiston, Ida.	.....								
(13)	Los Angeles Bureau of Power & Light	Big Pine No. 3	Big Pine, Calif.	Diversion	.....	.....	.....	44′	4,730	30–22′	8,500	Weld.
(14)	Merced Irrigation District	Exchequer	Merced River, Calif.	Constant Angle Arch	280,000	330	.....	.....	.....	96″	200	Rivtd.
(15)	Montana Power Company	Mystic Lake	West Rosebud River, Mont.	.....	20,000	25	Tunnel Wd. Pipe	..... 56′	1,000 9,000	48″ 44″–42″	2,800	Rivtd.
(16)	Northwestern Electric Company	Yale	Lewis River, Wash.	Gravity	36,000	160	Tunnel	20	500	13′ 13′	180–210	.....
(17)	Pacific Gas and Electric Company	Pit No. 3	Pit River, Calif.	Gravity	32,300	110	Concrtd. Tunnel	19	20,998	120–108″	550	.....
(18)	Pacific Gas and Electric Company	Melones	Stanislaus River, Calif.	Concrete Arch	112,500	210	Pres. Tunnel	12	4,800	8⅓–7⅓′	150	.....
(19)	Pacific Gas and Electric Company	Pit No. 4	Pit River, Calif.	Diversion	1,550	40	Concrtd. Tunnel	19	300	.....		
(20)	Pacific Power & Light Company	Deschutes	Deschutes River, Ore.	.....								
(21)	Puget Sound Power & Light Company	Baker River	Baker River, Wash.	Arch and Gravity	70,000	250	Concrtd. Tunnel	22	1,600	78″	150	.....
(22)	Sacramento Municipal Utility District	Big Bend	Silver Creek, Calif.	.....	45,000	130	.....					
(23)	Salt River Valley Water Users' Association	Horse Mesa	Salt River, Ariz.	Arch	300,000	300	.....			10′	350	Rivtd.
(24)	Salt River Valley Water Users' Association	Mormon Flats	Salt River, Ariz.	Arch	90,000	150	.....			8′	50	Rivtd.
(25)	San Joaquin Light & Power Corporation	Balch	Kings River, Calif.	Concrete	100	50	Tunnel	12x12	19,800	54–32″	4,842	Weld. Rivtd.
(26)	Southern California Edison Company	Big Creek No. 1	Big Creek, Calif.	*	*	*	*	*	*	54–24″	.....	Weld.
(27)	Southern California Edison Company	Big Creek No. 2	Big Creek, Calif.	*	*	*	*	*	*	42–24″	.....	Weld
(28)	Southern California Edison Company	Big Creek No. 2-A	Big Creek, Calif.	Multpl. Arch	135,000	190	.....	8x11	13,600	66–44″	6,500	.....
(29)	The Southern Sierras Power Company	Forest Home	San Bernardino County, Calif.	Concrete	Diversion	.....	Wood Pipe	1–2½	29,550	24–18″	6,064	Rivtd.
(30)	Turlock Irrigation District	La Grange	Tuolumne River, Calif	Gravity	Diversion	.....	.....	14	.....	7–5′	200	Rivtd.
(31)	Utah Power & Light Company	Cutler	Bear River, Utah	Gravity Arch	17,000	112	Steel Pipe	18	1,100	16–14′	117	Rivtd.
(32)	Utah Power & Light Company	Ashton	Snake River, Ida.	Rock Fill	.....	50	.....					Coner.
(33)	Washington Irrigation & Development Company	Priest Rapids	Columbia River, Wash.	.....	85,000	.....						

*Existing structures will be used.

†Abbreviations used are :A.-C., Allis-Chalmers Manufacturing Company; G. E., General Electric Company; West., Westinghouse Electric & Manufacturing Company; Pelt., Pelton Water Wheel Company; I. P. M., I. P. Morris Department William Cramp & Sons Ship & Engine Building Company; Worth., Worthington Pump & Machinery Corporation; W. S. M., Wellman-Seaver-Morgan Company; S. M. S., S. Morgan Smith Company.

Plants in the Eleven Western States 1925-1926

HEAD (Ft.)		PRIME MOVERS			GENERATING UNITS			PLANT CAPACITY (kw.)			TRANSMISSION LINES				
Static	Effective	No.	Capacity (hp.)	Maker	No	Capacity (kva.)	Maker	Present or Proposed	Ultimate	TRANSFORMERS	Length (mi.)	Voltage (kv.)	Type	PRESENT STAGE OF DEVELOPMENT	
90-130	115 Av.	1	15,000	A.-C.†	1	13,125	G.E.†	59,000	59,000	3-5,500 Kva. G.E.	*	*	*	Completed Sept., 1925	(1)
97-166	133 Av.	1	12,500	.....	1	10,000	.....	9,000	9,000	3-3,0 0 Kva.	10½	60	Wood Pole	To be completed, 1927	(2)
1,200	1,150	2	27,000	.....	2	22,500	.....	40,000	520,000	.....	130	165	.....	Proposed	(3)
157	140	2	20,000	A.-C.	2	15,000	West.	30,000	30,000	3-20,000 Kva. 6,600/66,000-110,000	77½	110	Wood Pole	Completed July, 1925.	(4)
380	.....	5	25,000	.....	5	20,000	.....	.....	100,000	.....	.....	.....	.....	Proposed	(5)
1,315	1,250	4	25,000	Pelt.	4	20,000	G.E.	80,000	120,000	13-6,667 Kva. West. 11,000/154,000 volt	98½	154	Steel Tower	Completed Aug. 1925	(6)
720	.....	.....	.....	.....	.....	.....	.....	.....	250,000	.....	.....	.....	.....	Proposed	(7)
260	231-120	2	25,000	A.-C.	2	30,000	A.-C.	40,000	120,000	6-10,000 Kva. A.-C. 13,200/110,000	44	110	Wood Pole	Completed Jan. 1925	(8)
474	.....	.....	.....	.....	.....	.....	.....	.....	112,000	.....	.....	.....	.....	Proposed	(9)
2,548	2,368	2	30,000	.....	2	25,000	.....	40,000	40,000	7-8,333 Kva. 11,000/240,000 volt	108	220	Steel Tower	To be completed Aug. 1927	(10)
1,150	1,074	2	15,000	.....	1	22,000	.....	88,000	135,000	3-7,500 Kva.	*	*	*	Proposed	(11)
.....	.....	.....	.....	.....	.....	.....	.....	10,000	.....	.....	.....	.....	.....	Proposed	(12)
1,253	1,116	1	4,500	Pelt.	1	3,200	G.E.	3,200	3,200	4-1,333 Kva. G.E.	4	3.3	Wood Pole	Completed 1925	(13)
300-140	260 Av.	2	24,500	Pelt-Morris	2	15,625	West.	30,000	30,000	3-10,400 Kva. G.E. 6,600/120,000 volt	20	110	Steel Tower	To be completed May 1926	(14)
1,150	1,050	2	7,500	Pelt.	2	6,250	West.	12,500	12,500	2-6,000 Kva. West.	27	51	Wood Pole	Completed March 1925	(15)
141.5	140	2	20,000	.....	2	18,000	.....	30,000	45,000	6-6,000 Kva. 11,000/66,000	40	66	.....	Proposed	(16)
313	280	3	33,000	Pelt.	3	27,000	G.E.	75,000	75,000	9-9,000 Kva. 11,000/110,000-220,000	81½	220	Steel Tower	Completed July 1925	(17)
235	228	2	17,000	.....	2	13,500	.....	27,000	27,000	4-9,000 Kva.	71½	104	.....	To be completed Jan. 1927	(18)
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Construction of Tunnels started 1925	(19)
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Proposed	(20)
228	.....	2	20,000	A.-C.	2	19,500	G.E.	30,000	60,000	7-6,667 Kva. G.E. 6,600/110,000	66½	110	Wood Pole	Completed Nov. 1925	(21)
1,627	.....	.....	.....	.....	.....	.....	.....	30,000	.....	.....	.....	.....	.....	Proposed	(22)
264	264	3	15,280	S.M.S.	3	11,100	G.E.	34,000	34,000	10-3,700 Kva. G.E. 11,000/110,000	4	110	Steel Tower	Construction started 1925	(23)
70-150	.....	2	10,000	S.M.S.	2	8,500	West.	14,000	14,000	4-3,000 Kva. West. 11,000/110,000 volt	1	.....	.....	To be completed Apr. 1926	(24)
2,381	2,243	2	20,000	A.-C.	1	33,000	G.E.	31,000	124,000	4-11,000 Kva. G.E. 13,200/132,000	39	132	Steel Tower	Construction started 1925	(25)
2,131	.....	1	35,000	Pelt.	1	25,000	West.	73,000	73,000	3-9,333 Kva. G.E. 11,000/150,000	*	*	*	Completed June 1925	(26)
1,860	.....	1	20,000	Pelt.	1	16,000	West.	64,000	64,000	3-5,833 Kva. G.E. 6,600/150,000	*	*	*	Completed April 1925	(27)
2,419	2,290	2	60,000	.....	2	40,000 kw.	.....	80,000	80,000	3-37,500 Kva. 11,000/220,000 volt	230	220	Steel Tower	To be completed May 1928	(28)
2,065	1,951	1	2,800	.....	1	5,000	.....	2,000	2,000	3-1,500 Kva.	8.2	87	Wood Pole	Completed 1925	(29)
117	115	1 1	1,350 4,000	S.M.S. A.-C.	2 1	500 3,000	West. A.-C.	4,000	8,000	4,000 Kva. A.-C. 4,000/73,000 volt	1½	73	.....	Completed 1925	(30)
126	124	2	21,500	I.P.M.	2	15,000	G.E.	30,000	30,000	6,600/130,000 volt G.E.	80	130	.....	To be completed 1926	(31)
48	47	2 1	3,000 3,150	S.M.S. S.M.S.	2 1	2,000 1,800	G.E. G.E.	5,800	5,800	6,000 Kva. 2,300/44,000 volt	15	44	.....	Completed 1925	(32)
71	.....	.....	.....	.....	.....	.....	.....	250,000	562,500	.....	.....	.....	.....	Proposed	(33)

Some Additions to Steam Electric Generating

	COMPANY	PLANT	LOCATION	BOILERS				FUEL	PRIME MOVERS		
				No.	Type	Capacity (hp.)	Maker		No.	Capacity (hp.)	Maker
(1)	Grays Harbor Railway & Light Company	Station No. 1 (Adtl. Unit)	Aberdeen, Wash.	1	.....	1,090	C.-H.†	Hogged Fuel	1	6,750	West.
(2)	Hawaiian Electric Company		Honolulu, T. H.	2	Water Tube	825	.....	Oil	1	15,000	West
(3)	Los Angeles Bureau of Power & Light		Los Angeles, Calif.	3	Water Tube	.....		Oil & Gas	1	36,000	.....
(4)	Los Angeles Gas & Electric Corporation	Seal Beach	Seal Beach, Calif.	3	Water Tube	2,545	B.&W.	Oil & Gas	1	48,000	West
(5)	Pasadena Municipal Light & Power Department	Glenarm St., 3rd Unit	Pasadena	No Addtl.	.....			Gas & Oil	1	20,000	.....
(6)	Pacific Power & Light Company	Young's Bay	Astoria, Ore.	.....				Hogged Fuel	1	7,500	G.E.
(7)	Public Service Company of Colorado	Valmont	Boulder, Colo.	No Addtl.	.....			Pulverized Coal	1	30,000	G.E.
(8)	San Diego Consolidated Gas & Electric Company	Station B, 3rd Unit	San Diego, Calif.	1	.....	1,166	.....	Oil	1	20,000	.....
(9)	Southern California Edison Company	Long Beach No. 2 3rd Unit	Long Beach, Calif.	7	.....	1,500	Con.	Oil & Gas	1	62,500	G.E.
(10)	Southern Sierras Power Company	San Bernardino	San Bernardino, Calif.	No Addtl.	.....			Oil	1	6,700	A.-C.

†Abbreviations:—C.-H., Casey-Hedges Company; B. & W., Babcock & Wilcox Company; Con., Connelly Boiler Company; West., Westinghouse Electric & Manufacturing Company; G. E., General Electric Company; A.-C., Allis-Chalmers Manufacturing Company.

taps a mountain lake beneath its surface for its water supply. In British Columbia, the B.C. Electric Railway Company, Ltd. added the fifth 13,125 kva. unit to its Stave Falls plant, bringing the capacity of this station to 59,000 kw.

The balance of the hydro added during the year was in four small plants, details of which are given in the accompanying table.

Many notable plants are under construction in the Western states at the present time. As this issue goes to press, work is almost completed in the City of Tacoma's Cushman No. 1 plant, which has an installed capacity of 60,000 kva. A description of this project, which has at its disposal 450,000 acre-ft. of reservoir capacity with only a 285-ft. dam, will appear in an early issue.

High-Head Plants

Two extremely high-head plants are under construction in California at the present time. One is the Buck's Creek plant of the Feather River Power Company, which will utilize the waters of Buck's Creek, a tributary of the Feather River, under a static head of 2,548 ft. The output of this 40,000-kw. plant is sold to the Great Western Power Company under an agreement which will result in the transfer of ownership of the station to that company at the end of thirty-five years.

The second high-head development is the Balch plant of the San Joaquin Light & Power Corporation on the Kings River which will generate initially 31,000 kw. under a static head of 2,381 ft. This plant has an ultimate capacity of 124,000 kw. Before the close of the present year active construction will have commenced on the Big Creek No. 2-A plant of the Southern California Edison Company, where 80,000 kw. will be generated under a head of 2,419 ft. Preliminary plans for this station call for two 60,000-hp. impulse wheels, which will establish a new record for size and head.

Work is progressing satisfactorily on two other important California projects, the Melones plant of the Pacific Gas and Electric Company and the Exchequer plant of the Merced Irrigation District. The former plant is on the Stanislaus River in central California and will have a capacity of 27,000 kw. It is being constructed under an agreement with the Oakdale and South San Joaquin Irrigation District whereby the power company will utilize water from an irrigation development at a flat fee per acre-foot. This plant will be completed early in 1927. The Exchequer plant is an integral part of an important irrigation project in the San Joaquin Valley. It will have a capacity of 30,000 kw. Its output has been sold to the San Joaquin Light & Power Corporation.

In the Intermountain district the Utah Power & Light Company is completing its Cutler plant on the Bear River. This station will be the lowest of a chain which completely utilizes the waters of that stream. It has a capacity of 30,000 kw. One of its unique features is the 18-ft. steel pipeline which carries water from the dam to the power house.

With the exception of the Alouette plant of the B.C. Electric Railway Company, Ltd., there are no developments under way in the Pacific Northwest although several are contemplated. One of three projects will be undertaken shortly by the Pacific Power & Light Company or its associated companies. Three projects are available—the Deschutes development on the Deschutes River in Oregon, the Yale project of the Northwestern Electric Company on the Lewis River in Washington, and the Lewiston project of the Inland Power & Light Company at Lewiston, Idaho.

An announcement of details regarding the Lake Chelan project of the Chelan Electric Company, recently purchased by The Washington Water Power Company, is expected at any time. Five 20,000-kw. units are proposed for this plant, the output from which will be used to supply energy for the elec-

Stations in the Eleven Western States, 1925-1926

GENERATORS			PLANT CAPACITY		TRANSFORMERS	TRANSMISSION LINE			PRESENT STATUS	
No.	Capacity (Kva.)	Maker	Present or Proposed	Ultimate		Length (mi.)	Voltage (Kv.)	Type		
1	5,000	West	6,900	6,900	3–1,667 Kva. G.E. 4,150/26,400 volt	.....			Completed 1925	(1)
1	12,500	West	22,500	37,500	.....				Completed 1925	(2)
1	31,250	.....	30,000	.....	3–10,500 Kva.	.....			Proposed 1926	(3)
1	30,000	West	30,000	200,000	4–12,500 Kva. West 13,200/110,000 volt	25	110	Steel Tower	Completed June 1925	(4)
1	15,000	.....	16,000	31,000	.....				Proposed 1926	(5)
1	6,250	G.E.	5,000	8,000	.....				Completed March 1925	(6)
1	25,000	G.E.	25,000	100,000	No Addtl.	.....			To be completed July 1926	(7)
1	18,750	.....	15,000	45,000	3–2,000 Kva. G.E.	.....			Proposed 1926	(8)
1	50,000	G.E.	50,000	120,000	4–20,000 Kva. G.E. 11,000/60,000	12	60	.....	To be completed Aug. 1926	(9)
1	5,000	A.-C.	5,000	10,000	No Addtl.	.....			To be completed 1926	(10)

trified section of the Great Northern Railway over the Cascade Mountains.

Two major developments of utmost importance to the West are held in abeyance at the present time—the Colorado River and the Priest Rapids project on the Columbia River. For the present there seems little likelihood of construction of any project on the Colorado as Arizona has still to reach an agreement with other basin states. Moreover, recent developments in Congress seem to preclude any real action. The license to the Washington Irrigation and Development Company for the Priest Rapids project calls for active construction to be in progress not later than March, 1927, and a definite announcement regarding the plans of this company may be expected in the spring.

Two important hydraulic developments connected with hydroelectric projects are in process in California. The Great Western Power Company is raising the height of its Big Meadows dam at Lake Almanor 45 ft., giving that reservoir a capacity in excess of 1,000,000 acre-ft. This water will be used in the Caribou and Big Bend power houses on the Feather River and in other plants to be constructed at a later date. The Southern California Edison Company has crews actively at work on the Shaver Lake tunnel, which will carry excess water from Huntington to Shaver Lake where it will be utilized in the Big Creek 2-A power house.

Steam Plant Construction

The only important steam plant completed during 1925 was the Seal Beach station of the Los Angeles Gas & Electric Corporation. This 30,000-kw. station has a future capacity of 200,000 kw. and will require an additional unit not later than 1927. A 12,500-kw. unit was installed in the Honolulu steam plant of the Hawaiian Electric Company during the year.

Work is under way on the installation of a 50,000-kw. unit in the Long Beach No. 2 plant of the Southern California Edison Company. This will be the largest steam unit west of the Mississippi and will raise the capacity of the station to 120,000 kw.

In Colorado The Public Service Company is placing a third unit in the Valmont steam plant at Boulder. The new unit will have a capacity of 25,000 kw.

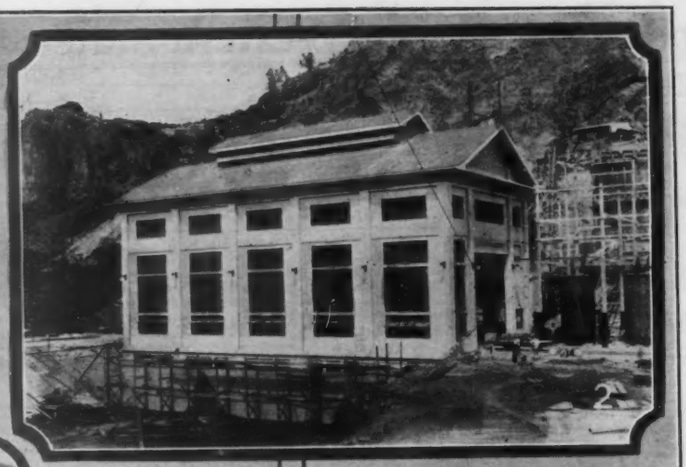
Three steam developments are proposed for the year. The Los Angeles Bureau of Power & Light contemplates the erection of a 30,000-kw. stand-by plant in the Los Angeles harbor district during the year. The San Diego Consolidated Gas & Electric Company will install a 15,000-kw. unit in Station B at San Diego. The Pasadena Municipal Light & Power Department also proposes to install an additional 15,000-kw. unit in its Glenarm Street station in Pasadena.

Transmission Line Construction

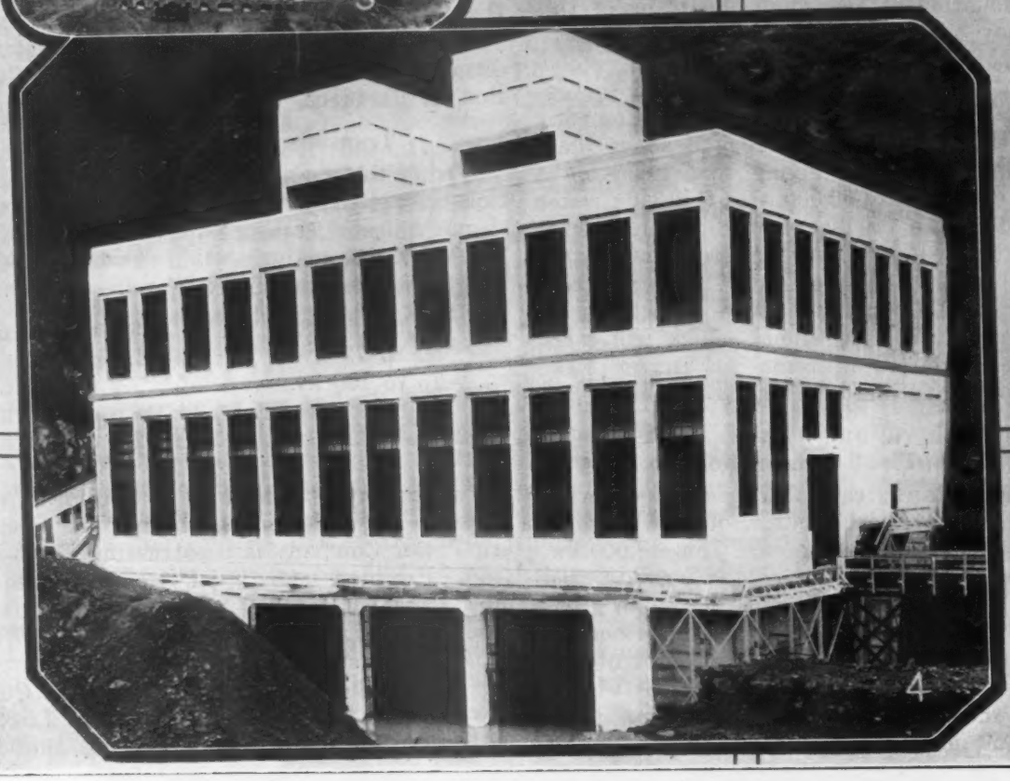
During the year just closed Western central stations completed or had under construction 1,865.9 circuit miles of transmission lines ranging from 30 to 220 kv., the major portion of which exceeded 100 kv. The classification follows:

30 to 50 kv.	183.7 circuit miles
50 to 75 kv.	483.7 circuit miles
75 to 100 kv.	7.2 circuit miles
100 to 165 kv.	818.8 circuit miles
220 kv.	372.5 circuit miles

Two important additions to California's 220-kv. network are under construction. The Great Western Power Company is constructing a 103-mile line from Brighton substation, near Sacramento, to Merced, which will tie its system with that of the San Joaquin Light & Power Corporation. This line will be completed early in 1926. Work is progressing on the Southern California Edison Company's new Vincent line, which will connect Los Angeles with the Big Creek plants, giving the company



FOUR of the major hydroelectric plants completed in the eleven Western states during 1925 are shown on this page. No. 1 is the Pit No. 3 plant of the Pacific Gas and Electric Company, fourth of a series of stations being erected on Pit River. It has a capacity of 81,000 kva. developed under a head of 280 ft. No. 2 shows the Copco No. 2 power house of The California Oregon Power Company on the Klamath River in northern California. It has a capacity of 30,000 kva. No. 3 is the 80,000-kva. Moccasin plant of the City of San Francisco, a part of the Hetch Hetchy development. No. 4 shows the Baker River plant of the Puget Sound Power & Light Company on Baker River in western Washington. Its capacity is 39,000 kva.



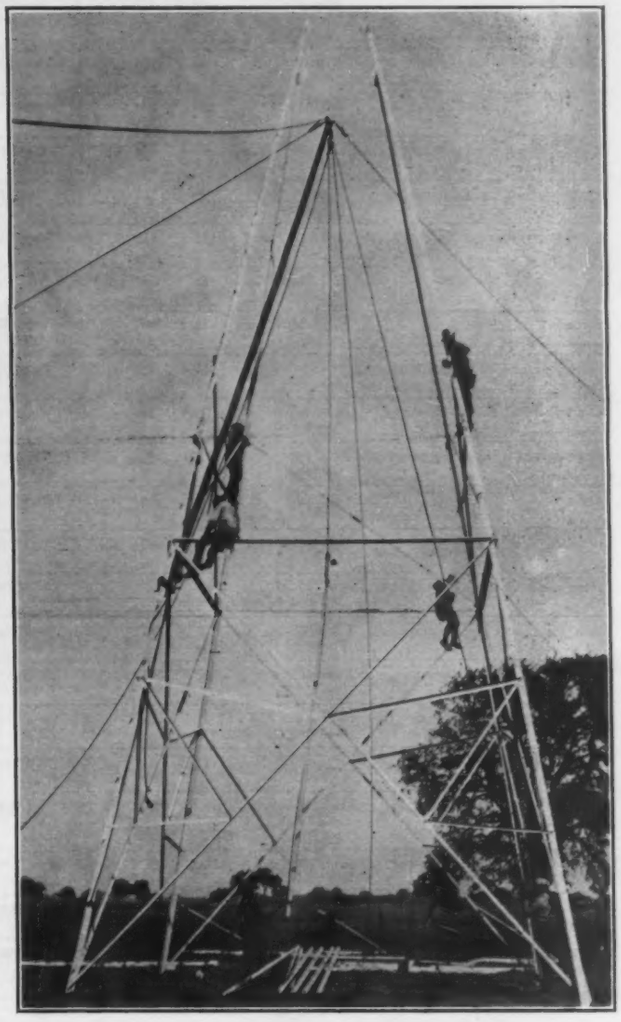
One of the towers on the new Kings River line of the San Joaquin Light & Power Corporation.

three 220-kv. circuits. Half of the line, from Los Angeles to Magunden substation in the San Joaquin Valley, will be completed in 1927 and the balance when the new Big Creek 2-A plant is ready in 1928. Two extensions to its 220-kv. system have been constructed by the Pacific Gas and Electric Company. One line connects Pit No. 3 with the system, and the other extends from Vaca-Dixon substation to the new Contra Costa substation. This latter line crosses both the San Joaquin and Sacramento Rivers in the Delta region and sets new records for high towers at those crossings.

In the Northwest both The Washington Water Power Company and the Puget Sound Power & Light Company made important extensions to their networks with 110 and 60-kv. lines.

Two lines of considerable size are proposed for the present year. The Los Angeles Bureau of Power and Light proposes to erect a two-circuit 110-kv. line from its new steam plant in the harbor district to Los Angeles, and The Washington Water Power Company has under consideration 70 miles of 110-kv. line from Fairfield, Wash., to Wallace, Idaho.

During the past year an important gap in the Pacific Coast interconnected system was closed when the lines of the Portland Electric Power Company and the Mountain States Power Company were interconnected. The tie is between Independence and Salem, Ore. As a result, the hydroelectric systems in the vicinity of Portland now are connected with the California systems over the lines of the Mountain States Power Company and The California Oregon Power Company. But one gap



Erecting a tower on the Brighton-Merced 220-kv. tie line between the systems of the Great Western Power Company and the San Joaquin Light & Power Corporation.

now remains between the Washington-Montana interconnected system and the Oregon-California systems. With the construction of a line connecting its eastern and western divisions, the Pacific Power & Light Company will tie the two together along the Columbia River. Or a line can be built between the system of the Northwestern Electric Company and the Puget Sound Power & Light Company in southern Washington to accomplish the same purpose.

Some Additions to Transmission Systems in the Eleven Western States 1925-1926

COMPANY	LOCATION	Length (Miles)	Voltage (Kv.)	No. of Circuits	SUPPORTS	CONDUCTOR	INSULATORS	SPANS		STATUS
								Aver. (ft.)	Max. (ft.)	
Coast Counties Gas & Electric Company	Morgan Hill to Watsonville, Calif.	20	60	1	Wood Pole	3/0 Copper	Pin type	264	1,200	To be completed 1926
Coast Valleys Gas & Electric Company	New Idria Mine to Maltby Magnesite Mine	3.5	30	1	Wood Pole	No. 4 Copper	Pin type Locke	350	.....	Completed 1925
City of San Francisco	Moccasin to Newark Substation, Calif.	98.5	154	2	Steel Tower P.C.S.†	90% 250,000 c.m. A.C.S.R. 10% 345,000 c.m. Copper An.	10-601 West	900	2,400	Completed June 1925
Great Western Power Company of California	Napa to Santa Rosa, Calif.	43	44	1	Wood Pole	No. 1 Copper 25 mi. No. 4 Copper 18 mi.	Pin type O.B.	350	624	Completed 1925
Great Western Power Company of California	Brighton to Merced, Calif.	103	220	1 2 U.H.	Steel Tower P.C.S.	795,000 c.m. A.C.S.R.	14-Suspension Locke	831	1,331	To be completed 1926
Inland Power & Light Company*	Hanford to Taunton, Wash.	15.3	110	1	Wood Pole B.J.C.	1/0 Str. Copper An.	10" Disc. 6 Unit West.	500	1,830	Completed 1925
Inland Power & Light Company*	Pomeroy to Clarkston, Wash.	29.5	66	1	Wood Pole W.S.C.	1/0 Str. Copper An.	Pin & 10" Disc. Locke	250	1,370	Completed 1925
Los Angeles Bureau of Power & Light	Los Angeles and Harbor Dist. Calif.	25	110	2	Steel Tower	Copper	.....			Proposed 1926
Los Angeles Gas & Electric Corporation	Seal Beach to Los Angeles, Calif.	25	110	2	Steel Towers P.C.S.	300,000 c.m. Copper An.	Suspension West	800	905	Completed 1925
Montana Power Company	Edgar to Billings, Mont.	28.2	50	1	Wood Pole	91,665 c.m. Str. Copper	Pin type Pyrex	278	840	Completed 1925
Mountain States Power Company	Albany to Springfield, Ore.	44.2	66	2	Wood Pole	2/0 Copper An.	Pin Type O.B.	300	.....	To be completed 1926
Mountain States Power Company	Independence to Salem, Ore.	10.8	66	1	Wood Pole	2/0 Copper An.	Pin type O.B.	300	.....	Completed 1925
Mountain States Power Company	Albany to Corvallis, Ore.	11.5	66	2	Wood Pole	No. 2 Str. Copper An.	Pin type O.B.	300	.....	Completed 1925
Pacific Gas & Electric Company	Cooley Landing to Martin Sta., Calif.	25.2	110	2	Steel Towers P.C.S.	250,000 c.m. Str. Copper	8-Suspension	800	.....	Completed 1925
Pacific Gas & Electric Company	Pit 3 to Pit 1&2 lines, Calif.	8.5	220	2	Steel Towers P.C.S.	518,000 c.m. A.C.S.R.	13-Suspension	700	2,400	Completed 1925
Pacific Gas & Electric Company	Mt. View Sub. to Murietta Pt., Calif.	24	60	1	Wood Poles	3/0 Str. Copper	Pin type	200	2,500	Completed 1925
Pacific Gas & Electric Company	Lines 1&2, So. San Francisco	3.5	110	2	Steel Tower P.C.S.	4/0 Str. Copper	8-Suspension	800	.....	Completed 1925
Pacific Gas & Electric Company	Delta to Shasta Sub., Calif.	42	110	1	Poles & Towers	250,000 c.m. Str. Copper	8-Suspension	600	1,700	Completed 1925
Pacific Gas & Electric Company	Sierra Lines 1&2 So. San Francisco	3	110	2	Steel Towers P.C.S.	2/0 Str. Copper	7-Suspension	800	.....	Completed 1925
Pacific Gas & Electric Company	So. San Francisco to Martin Sta.	2.7	110	2	Steel Towers P.C.S.	4/0 Str. Copper	8-Suspension	800	.....	Completed 1925
Pacific Gas & Electric Company	Vaca-Dixon Sub. to Contra Costa Sub.	14.5	220	2	Steel Towers P.C.S.	500,000 c.m. Copper	13-Suspension	800	4,000	To be completed 1926
Portland Electric Power Company	Sta. P, Oak Grove & Faraday, Ore.	18.7	57.1	1	Steel Towers P.C.S.	250,000 c.m. Copper	7-10" Susp. O.B.	600	1,600	2nd Circuit added 1925
Portland Electric Power Company	Lents Junct. to Sellwood, Ore.	5.3	57.1	1	Steel Towers Mill	250,000 c.m. Copper	4-10" Susp. O.B.	500	560	2nd Circuit added 1925
Portland Electric Power Company	Newberg to West Salem, Ore.	30.5	57	1	Wood Pole	2/0 Str. Copper	Pin type O.B.	200	.....	Completed 1925
Portland Electric Power Company	Boring to Morrow, Ore.	10.5	57.1	1	Steel Tower Mill	250,000 c.m. Copper	10"-Suspension O B.	500	560	2nd Circuit completed 1925
Portland Electric Power Company	Faraday to River Mill, Ore.	3.2	57.1	2	Wood Pole	1/0 Str. Copper	Pin type O.B.	100	.....	Completed 1925
Portland Electric Power Company	Boring, Linneman, Sycamore & Lents Junct., Ore.	10.4	57.1	1	Wood Pole	2/0 Str. Copper	Pin type O.B.	200	.....	Completed 1925
Portland Electric Power Company	Sta. L. to Oaks, Ore.	.....	57.1	1	Steel Tower Mill	250,000 c.m. Copper	4-10" Susp. O.B.	500	.....	Under construction
Puget Sound Power & Light Company	Beverly Park Sub. to Canal Sub., Wash.	22	55	1	Wood Pole	Al. 4/0 Copper equivalent	No. 82-A Pinco	210	300	Completed 1925
Puget Sound Power & Light Company	Sedro-Woolley Sub. to Bellingham, Wash.	23.8	55	1	Wood Pole	4/0 Str. Copper	No. 82-A Pinco	300	.....	Completed 1925
Puget Sound Power & Light Company	Baker River to Beverly Park Sub., Wash.	66.5	110	1	Wood Pole	4/0 Str. Copper	6-No. 1166 Thomas Suspension	450	1,780	Completed 1925

Some Additions to Transmission Systems in the Eleven Western States 1925-1926—Continued.

COMPANY	LOCATION	Length (Miles)	Voltage (Kv.)	No. of Circuits	SUPPORTS	CONDUCTOR	INSULATORS	SPANS Aver. (ft.)	SPANS Max. (ft.)	STATUS
San Diego Consolidated Gas & Electric Company	San Diego to El Cajon, Calif.	10.25	66	1	Wood Pole	1/0 Copper	5-Locke Suspension	378	1,030	Completed 1925
Southern California Edison Company	Highlands to San Bernardino, Calif.	6.5	30	1	Wood Pole	4/0 Al.	Pin type	.....		Completed 1925
Southern California Edison Company	Colton to Riverside, Calif.	6	30	1	Wood Pole	No. 2 Copper	Pin type	.....		Completed 1925
Southern California Edison Company	San Bernardino to Colton, Calif.	4	30	1	Wood Pole	4/0 Al.	Pin type	.....		Under construction
Southern California Edison Company	Colton to Colton Cement Works, Calif.	1.75	60	1	Wood Pole	4/0 Al.	10" C.&P. Susp.	.....		Under construction
Southern California Edison Company	Colton to Colton Cement Works, No. 2, Calif.	1.5	60	1	Wood Pole	4/0 Al.	10" C.&.P. Susp.	.....		Under construction
Southern California Edison Company	Los Angeles No. 3 to Eagle Rock Sub., Calif.	8	60	1	Wood Pole	4/0 Copper and 605,000 c.m. A.C.S.R.	10" C.&.P. Susp.	.....		Completed 1925
Southern California Edison Company	Laurel to Tulare, Calif.	3	60	1	Wood Pole	2/0 Copper	10" C.&.P. Susp.	.....		Completed 1925
Southern California Edison Company	Moorpark to Saugus, Calif.	15	60	1	Steel Tower P.C.S.	4/0 Copper	10" C.&.P. Susp.	.....		Completed 1925
Southern California Edison Company	Torrence to Redondo, Calif.	2	60	1	Wood Pole	4/0 Copper	10" C.&.P. Susp.	.....		Completed 1925
Southern California Edison Company	Venida to Kaweah, Calif.	21	60	1	Wood Pole	2/0 Copper	10" C.&.P. Susp.	.....		Completed 1925
Southern California Edison Company	Saticoy to Castaic, Calif.	11	60	1	Steel Tower P.C.S.	2/0 Copper	10" C.&.P. Susp.	.....		Completed 1925
Southern California Edison Company	Crescenta Sta., Los Angeles to Big Creek 3, Calif.	223.5	220	1	Steel Tower P.C.S. and N.N.S.&.D.	1,033,500 c.m. A.C.S.R.	13"-10" Susp. West.	1,420	5,191	To be completed Apr. 1928
Southern Colorado Power Company	Pueblo to Canyon City, Colo.	39	66	1	Wood Pole W.E.&B.L.C.	No. 1-Str. Copper C.I.W.&M.C.	4- No. 2300 Locke	550	2,100	Completed 1925
Southern Colorado Power Company	Rocky Ford to La Junta, Colo.	11	66	1	Wood Pole	No. 1 A.C.S.R.	Pin type Thomas	225	350	Completed 1925
The Southern Sierras Power Company	Andrade to border, Calif.	1.7	33	1	Wood Pole J.H.B.	No. 2 Str. Copper	Pin type Pinco	261	461	Completed 1925
The Southern Sierras Power Company	El Centro to Calexico, Calif.	14	33	1	Wood Pole	1/0 Copper	Pin type	264	.....	Proposed 1926
The Southern Sierras Power Company	Forest Home to Mill Creek, Calif.	7.2	88	1	Wood Pole L.B.	2/0 A.C.S.R.	5-Susp. Locke	425	1,425	Completed 1925
Salt River Valley Water Users' Association	Horse Mesa Connection, Ariz.	4.5	110	2	Steel Tower P.C.S.	2/0 Copper An.	No. 5800 Locke	800	1,800	Completed 1925
Salt River Valley Water Users' Association	Goldfield to Superior, Ariz.	30	110	1	Steel Tower M.I.W.	2/0 Copper An.	No. 5800 Locke	800	1,800	Completed Jan. 1926
Salt River Valley Water Users' Association	Roosevelt, Miami, Superior, Mesa, Ariz.	89	110	1	Steel Tower	2/0 Copper	No. 5800 Locke	800	1,800	To be completed 1926
Salt River Valley Water Users' Association	Chandler Sub. to Casa Grande Sub.	23	45	3	Wood Pole	2/0 Copper	No. 5800 Locke	300	.....	Completed 1925
Truckee River Power Company	Washoe Power House to Virginia City, Nev.	20.9	60	1	Wood Pole	No. 4 Str. Al.	No. 7210 Locke Pin type	200	1,100	Completed 1925
Union Pacific Coal Company	Rock Springs to Superior, Wyo.	20	36	2	Wood Pole C.P.C.	No. 4 Copper	Pin type O.B.	175	.....	Completed 1925
Washington Water Power Company	Long Lake to Stratford, Wash.	87	110	1	Wood Pole V.&.C.	7 St. Copper An.	6-Susp. Locke and Thomas	512	1,285	Completed 1925
Washington Water Power Company	Fairfield, Wash., to Wallace, Ida.	70	110	1	Wood Pole	7 Str. Copper	.....			Proposed 1926
Washington Water Power Company	Long Lake to Spokane, Wash.	28	110	1	Wood Pole B.J.C.	3/0 Copper An.	6-Susp. O.B. and Thomas	473	1,590	Completed 1925
Washington Water Power Company	Spokane to Tekoa, Wash.	38	110	1	Wood Pole C.C.C.	2/0 Copper An.	4-Susp. O.B. and Thomas	450	1,180	Completed 1925
Washington Water Power Company	Taunton to Neppel, Wash.	24.2	110	1	Wood Pole C.C.C.	7 Str. Copper An.	5-Susp. J.D.I.	400	1,285	Completed 1925

*Operated by Pacific Power & Light Company.

†*Abbreviations:*—Towers and Poles: P.C.S., Pacific Coast Steel Company; B.J.C., B. J. Carney Company; W.S.C., Weyerhaeser Sales Company; Mill., Milliken Brothers; N.N.S.&D., Newport News Shipbuilding and Drydock Company; W.E., Western Electric Company; B.L.C., Bell Lumber Company; J.H.B., J. H. Baxter & Company; L.B., Lindsley Brothers Company; M.I.W., Muskogee Iron Works; C.P.C., Chapin Pole Company; V.&.C., Valentine & Clark Company; C.C.C., Cook Cedar Company. Conductor:—A.C.S.R., Aluminum Company of America; An., Anaconda Copper Mining Company; C.I.W.&M.C., Chicago Insulating Wire & Manufacturing Company. Insulators:—Locke, Locke Insulator Corporation; West., Westinghouse Electric & Manufacturing Company; O.B., Ohio Brass Company; Pyrex, Corning Glass Company; Pineo, Porcelain Insulator Corporation; Thomas, R. Thomas & Sons Company; J.D.I., Jeffery-Dewitt Insulator Company.

West Leads United States in Power Development

CENTRAL stations of the eleven Western states continue to hold their own with the light and power industry of the nation as a whole. Figures covering the operations of the power companies of this section for 1925 show that the West possesses 14.3 per cent of the total central station customers and 14 per cent of the wired homes of the country. Its power companies generate 19.5 per cent of the total energy generated in the country and 45 per cent of the total energy produced from hydro plants.

Energy generation for the year was 11,594,000,000 kw-hr. as against 10,534,456,000 kw-hr. for 1924, an increase of 10.7 per cent. Of the energy generated 9,749,000,000 kw-hr. was produced by hydro plants and 1,845,000,000 kw-hr. by steam plants. In 1924 but 7,507,327,000 kw-hr. were produced by hydro plants and 3,027,129,000 kw-hr. by steam plants due to the exceedingly dry year on the Pacific Coast. For the same reason there was an appreciable drop in the consumption of oil and natural gas by Western central stations during the year as against 1924. Oil consumption dropped from 7,168,081 bbl. in 1924 to 2,790,000 bbl. in 1925 while the use of natural gas fell from 22,595,903,000 cu. ft. to 10,114,500,000 cu. ft. The West used 27.2 per cent of all fuel oil used in the United States by light and power companies.

The estimated gross revenue for the sale of energy for the year was $195,000,000 as against $170,000,000 for 1924, an increase for the year of 14.7 per cent, or more than $2,000,000 per month. The operating ratio for the industry as a whole for the year is materially below that of 1924, due to more normal operation following the water shortage of 1924. The operating ratio for the past year was 33.8 per cent as against 43.2 per cent for 1924. Operating and maintenance expenses for the past year were $66,000,000 as against $73,530,000 for 1924. The operating ratio of central stations of the country as a whole for 1925 was 44.8 per cent.

During the year just passed the number of central station consumers in the eleven Western states increased by 146,249 bringing the total to 2,565,950 as compared to 17,937,160 for the United States. Thus the West has 14.3 per cent of the nation's total. The number of domestic lighting consumers as of Jan 1, 1926, was 2,030,630, 14 per cent of the total for the country which was 14,532,930. The increase for the year was 102,763. The number of commercial lighting consumers was 389,280, an increase of 28,174 for 1925.

No section of the United States shows a greater development of industrial power load than the eleven Western states. The number of industrial power consumers connected to the lines of Western central stations as of Jan. 1, 1926, was 148,140 or 23.8 per cent of the total for the country at large. The growth for the year was 15,355 customers. A complete discussion of the industrial load for this section will be found on page 90 of this issue.

California leads the Western states with 1,499,350 consumers or 51.5 per cent of the total. Washington, Colorado, Oregon and Utah follow in order. California is only exceeded in the total number of customers served by New York and Illinois, the former having 2,015,600 consumers and the latter 1,582,550. In the number of commercial lighting consumers California is second only to New York with 247,000 as against 405,000 for the Empire state. California far outdistances all states in the number

Table II—Energy Generated in Public Utility Plants of 11 Western States, 1921-25

State	Energy Generated (Thousands of Kw-hr.) 1921*	1922*	1923*	1924*	1925†
California	3,982,938	4,379,703	5,069,314	5,566,440	6,090,000
Oregon	468,534	512,804	594,434	678,394	737,000
Washington	1,176,662	1,285,625	1,446,486	1,503,560	1,818,000
Nevada	36,532	39,282	47,048	41,623	36,000
Utah	119,551	145,689	272,577	266,946	355,000
Arizona	132,434	144,615	157,183	153,196	135,000
New Mexico	15,768	17,140	18,268	19,913	22,000
Colorado	362,651	413,475	461,570	490,030	528,000
Wyoming	37,855	38,985	48,853	53,556	62,000
Idaho	550,149	615,783	694,871	792,532	752,000
Montana	596,610	984,972	1,138,545	1,145,285	1,238,000

*U. S. G. S. data.

†November and December estimated.

Table 1—Central Station Operation, 11 Western States and United States, 1924 and 1925

Item	11 Western States 1924	1925	United States 1924	1925
Energy Generated, (thousands of kw-hr.)	10,534,456	11,594,000	54,413,403	59,517,000
Energy Generated by Hydro Plants (thousands of kw-hr.)	7,507,327	9,749,000	19,646,801	21,570,000
Energy Generated by Steam Flants (thousands of kw-hr.)	3,027,129	1,845,000	34,776,602	37,947,000
Coal Consumption by Central Stations (tons)	644,932	724,800	32,556,970	35,488,800
Fuel Oil Consumption by Central Stations (bbl.)	7,168,081	2,790,000	16,096,675	9,869,000
Gas Consumption by Central Stations (thousands cu. ft.)	22,595,903	10,114,500	46,993,070	47,313,400
Gross Revenue (dollars)	170,000,000	195,000,000	1,354,570,000	1,470,000,000
Operating and Maintenance Expense	73,530,000	66,000,000	617,980,000	659,000,000

Table III—Classification of Central Station Customers in the 11 Western States Showing Growth for 1924, 1925 and 1926

State	Total Domestic Lighting Customers			Total Commercial Lighting Customers			Total Industrial Power Customers			Total Customers—All Classes		
	Jan. 1 1924	Jan. 1 1925	Jan. 1 1926	Growth 1925	Jan. 1 1924	Jan. 1 1925	Jan.1 1926	Growth 1925	Jan. 1 1924	Jan. 1 1925	Jan. 1 1926	Growth 1925
California	902,680	1,091,892	1,154,500	62,608	197,060	227,640	247,000	19,360	76,686	88,207	97,850	9,643	1,176,426	1,407,739	1,499,350	91,611
Oregon	126,050	137,943	145,300	7,357	20,250	22,063	23,530	1,467	6,906	7,739	8,400	661	153,206	167,745	177,230	9,485
Washington	233,530	248,160	266,500	18,340	36,164	41,981	45,500	3,519	11,886	13,954	19,370	3,416	281,580	304,095	329,370	25,275
Nevada	12,180	13,590	13,630	40	1,850	2,129	2,240	111	485	542	580	38	14,515	16,261	16,450	189
Utah	96,240	104,630	107,800	3,170	10,160	10,774	11,310	536	2,252	2,936	3,210	274	108,652	118,339	122,320	3,980
Arizona	25,670	29,090	30,550	1,460	1,460	4,775	5,190	415	1,455	1,776	1,930	154	31,585	35,641	37,670	2,029
New Mexico	18,100	19,550	20,400	850	3,110	3,334	3,550	216	817	942	1,000	58	22,027	23,826	24,950	1,124
Colorado	133,190	146,670	150,800	4,130	19,820	21,900	23,000	1,100	6,779	8,140	8,910	770	159,789	176,710	182,710	6,000
Wyoming	26,010	27,290	27,400	110	3,080	3,331	3,360	29	1,047	1,265	1,280	15	30,137	31,886	32,040	154
Idaho	45,040	48,321	50,800	2,479	10,300	11,203	11,830	627	1,788	1,887	2,000	113	57,128	61,411	64,630	3,219
Montana	54,820	60,731	62,950	2,219	10,865	11,976	12,770	794	2,805	3,297	3,510	213	68,490	76,004	79,230	3,226
Total 11 West. Sts.	1,673,510	1,927,867	2,030,630	102,763	314,119	361,106	389,280	28,174	112,906	130,685	148,040	15,355	2,103,535	2,419,657	2,565,950	146,249
Total U. S.	11,623,644	13,406,777	14,532,930	1,126,153	2,258,347	2,588,983	2,781,280	192,297	502,736	570,844	622,950	52,106	14,384,727	16,566,604	17,937,160	1,370,556
% of U. S. Total	14.4	14.3	14.0		14.0	14.0	14.0		22.3	22.8	23.8	28.8	14.6	14.6	14.3	

of industrial power consumers served by central stations with 97,850 against 55,800 for New York and 42,150 for Illinois, its nearest rivals.

California was exceeded by New York and Pennsylvania in the amount of energy generated during the year. The generation for 1825 was: New York 10,050,000,000 kw-hr.; Pennsylvania, 6,430,000,000 kw-hr.; California, 6,090,000,000 kw-hr. Washington, with 1,818,000,000 kw-hr. generated was seventh in the list of states, and second for the West.

Report Shows 280,000,000 Lamps Sold During 1925; Many Improvements

THE sale of incandescent lamps such as are used in the lighting of homes reached the total of 280,000,000 in 1925, according to the annual review of the electrical industry by John Liston of the General Electric Company. This is an increase of 7¼ per cent over 1924, and four and one-half times the figure for 1908. In addition, the sale of miniature lamps, such as are used in automobiles, flashlights, on Christmas trees, and so on, reached the total of 195,000,000, an increase of about 3½ per cent over 1924. The large-lamp business, which in 1908 amounted to nearly 64,000,000 lamps sold, has grown to about four and a half times that volume.

"Although the average wattage of lamps has varied but slightly, the average lumens or candlepower has increased considerably," Mr. Liston points out. "The price of Mazda lamps has been reduced materially in recent years, due to improved methods in manufacture. The present prices of lamps are on the average less than two-thirds of those in effect in 1914, while the cost of living is now 50 per cent greater than the prewar figure."

The most important development of the past year was the development of a practical method of frosting the inside surface of incandescent lamp bulbs. The fragility hazard which formerly existed has been overcome by a chemical treatment. Since the outside of the new bulb is smooth, it does not collect dust as readily as does an outside-frosted lamp and is more easily cleaned. Also, the initial absorption of light due to inside frosting is less than two per cent, while the outside frost absorbs six to eight per cent.

In the miniature lamp field the most important achievement was the production of the double-filament Mazda headlight lamp. It contains two 21-cp. filaments. When one filament is lighted, a powerful beam is projected far down the road. When the other filament is lighted, the beam is tilted down about 2½ deg., so that there is no glare in the eyes of an approaching driver and yet ample light for safe driving.

A further improvement in the automobile-headlight lamp was the introduction of corrugations at the end of the bulb. These are for the purpose of breaking up the image reflected by the bulb, thus eliminating a source of glare.

Table I—Distribution of the Industrial Power Load in the United States

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting: Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines	Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers: Number	Boilers: Hp.
All industries	33,143,753	13,386,996	3,340,204	1,254,140	1,803,317	13,359,096	8,888,569	60,192	16,069,113
Chemicals and allied products	2,738,605	1,060,992	410,660	78,877	168,557	1,019,519	674,556	7,390	2,168,454
Food and kindred products	3,723,130	1,586,547	123,719	182,386	120,912	1,709,566	513,037	9,428	2,229,858
Iron and steel and their products not including machinery	7,243,340	3,629,067	1,047,810	613,724	21,190	1,931,549	3,029,828	9,645	3,602,405
Leather and its finished products	412,961	172,329	41,722	4,256	3,884	190,770	123,029	1,406	278,705
Lumber and allied products	3,336,333	2,336,854	186,575	48,711	42,746	721,447	507,329	11,950	2,384,769
Machinery	2,267,185	442,383	216,403	69,064	26,522	1,512,813	740,352	2,577	613,285
Metal and metal products other than iron or steel	1,168,693	299,376	138,178	23,173	11,814	696,152	283,544	969	301,094
Musical instruments and phonographs	90,229	35,539	16,997	743	79	36,871	39,078	359	62,994
Paper and printing	2,742,693	798,571	194,409	15,186	886,462	848,065	653,081	2,365	774,599
Railroad repair shops	806,435	306,195	52,873	23,684	88	423,959	271,731	1,898	472,208
Rubber Products	605,634	135,338	121,697	8,859	6,506	333,234	180,799	497	221,687
Stone, glass, and clay products	1,919,235	729,529	117,650	92,090	30,582	949,384	424,996	3,066	798,212
Textiles and their products	3,800,360	1,379,328	457,772	30,112	466,364	1,466,784	911,262	6,029	1,481,865
Tobacco Manufacturers	43,481	22,587	4,574	417	0	15,903	15,254	254	41,971
Transportation equipment, air, land and water	1,667,968	295,405	169,057	50,490	10,940	1,142,076	453,972	969	403,466
Miscellaneous industries	577,471	156,956	40,108	12,368	6,671	361,368	66,721	1,390	233,541

The Industrial Load of the West

THAT the manufacturing plants in the eleven Western States are 65.0 per cent electrified and that the central stations furnish 79.3 per cent of the energy consumed by them are the two outstanding facts indicated by an industrial survey just completed by the McGraw-Hill Company as a part of a nation-wide investigation. Summarized and detailed state data on the use of electrical energy by the various industries in the United States and in the West will be found in the accompanying tabulations. Detailed state data for sections east of the Rockies have appeared in recent issues of Electrical World, and are available upon application to that journal.

MOUNTAIN and Pacific industries are as a whole the most highly electrified in the country. Although there are 389 private generating plants, central stations supply 79.3 per cent of the total electric energy consumed.

The rating in the power machinery installed in the manufacturing establishments of the Mountain and Pacific States on Jan. 1, 1924, was 2,664,687 hp., having increased by 1,091,395 hp. or 70 per cent, during the ten-year period 1914-1924. Over 70 per cent of this total primary power is concentrated in the three Pacific states. Based upon returns received in the survey, the estimate is made that 283,804 hp. of this total power is installed in private electric generating plants and that 1,447,925 hp. is in electric motors which are run by energy purchased from central station lines. Using these figures as a basis, it is estimated that industry as a whole in the Mountain-Pacific States is now 65.0 per cent electrified. This is the highest degree of industrial electrification reported by any section in the country, other sections reporting as follows: New England 58.2 per cent, Middle Atlantic 59.6 per cent, North Central 64.0 per cent and the Southern States 50.6 per cent.

These eleven Western States report 389 private

Table II—Distribution of the Industrial Power Load in the Pacific States

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting: Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines	Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers: Number	Boilers: Hp.
All industries	1,886,942	647,720	101,393	27,906	50,092	1,059,831	253,036	2,031	527,716
Chemicals and allied products	159,240	33,107	7,487	5,612	491	112,543	5,151	138	40,380
Food and kindred products	275,966	60,253	4,084	4,661	3,645	203,323	24,445	184	40,690
Iron and steel and their products, not including machinery	79,529	2,552	336	253	0	76,388	0	4	1,238
Leather and its finished products	6,984	1,584	72	6	0	5,322	808	15	1,874
Lumber and allied products	794,867	505,565	80,350	12,861	10,780	185,311	197,734	1,474	398,000
Machinery	80,867	1,200	1,530	1,025	41	77,071	106	41	4,103
Metal and metal products other than iron and steel	20,302	1,017	298	44	1	18,942	13	2	620
Musical instruments and phonographs	834	0	0	0	0	834	0	0	0
Paper and printing	151,304	27,481	6,050	199	30,635	86,939	18,134	95	28,170
Railroad repair shops	47,978	7,348	0	349	0	40,281	376	8	3,688
Rubber products	17,819	115	195	0	0	17,509	0	1	166
Stone, clay, and glass products	105,746	4,156	63	1,419	2,905	97,203	4,671	43	5,170
Textiles and their products	21,474	540	458	43	1,586	18,847	375	7	1,240
Tobacco manufacturers	508	0	0	0	0	508	0	0	0
Transportation equipment, air, land and water	77,748	984	74	199	5	76,486	479	4	796
Miscellaneous industries	45,776	1,818	396	1,235	3	42,324	744	15	2,041

as of January 1, 1924 and Energy Consumed by Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
113	8,157	59.7	31,004,483	19,373,722	11,630,761	5,913,462	4,411,577	1,501,885	1,176,439	15,389,566	668,298	6,858,099	989,010	2,266,441
454	664	60.3	4,442,617	3,379,952	1,062,665	584,344	397,896	186,448	78,898	1,251,499	77,042	442,576	87,474	240,866
858	1,627	60.2	3,517,092	2,670,520	846,572	494,514	297,635	196,879	94,070	1,347,866	106,059	874,737	109,283	282,764
405	670	54.0	6,103,792	2,393,789	3,710,003	1,830,094	1,497,778	332,316	62,394	2,200,614	122,056	2,760,763	49,340	138,686
705	259	62.8	404,164	243,560	160,604	63,306	36,775	26,531	21,343	221,450	11,551	92,349	16,533	46,446
769	1,045	31.2	1,357,710	777,511	580,199	293,704	243,284	50,420	81,076	1,110,787	12,536	117,989	50,207	139,478
285	746	80.9	1,694,777	1,190,894	503,883	302,439	184,923	117,516	150,507	1,590,097	88,864	663,068	158,896	355,560
994	218	81.1	1,506,129	1,095,928	410,201	232,436	117,302	115,134	60,000	627,944	36,325	351,752	47,886	116,844
994	56	73.4	57,140	27,940	29,200	27,173	19,306	7,867	4,992	57,768	2,245	18,181	3,824	8,528
599	576	57.2	3,986,139	2,262,323	1,723,816	645,262	562,441	82,821	41,270	1,245,510	29,643	255,636	31,576	76,385
208	275	71.8	592,390	360,079	232,311	144,516	99,525	44,991	22,904	403,179	20,051	292,167	15,433	50,285
687	86	80.3	872,074	558,259	313,815	142,091	124,265	17,826	68,747	440,462	5,785	73,571	49,834	119,910
212	555	59.3	1,638,143	1,139,421	498,722	173,542	122,782	50,760	44,776	1,183,082	25,689	191,298	32,878	123,882
865	978	56.1	2,171,102	1,322,071	849,031	606,584	542,402	64,182	282,705	2,162,697	51,507	215,349	229,125	339,247
971	44	66.7	39,753	24,829	14,924	12,101	5,175	6,926	8,560	17,971	3,034	13,186	8,343	10,384
466	182	87.2	2,050,946	1,451,914	599,032	286,379	143,137	143,242	130,377	1,334,272	26,684	261,776	43,806	111,566
541	176	76.6	570,515	474,732	95,783	74,977	16,951	58,026	23,820	194,368	49,227	233,721	54,572	105,610

industrial electric generating plants, by far the lowest number reported by any section of the country. These private plants have a total generator rating of 262,942 kva. which exceeds by 48,000 kva. the combined rating of the central station plants in Idaho, Wyoming, New Mexico, Arizona and Nevada. During 1924 these private plants generated a total of 535,940,000 kw.-hr. In addition to this consumption of privately generated energy, the industrial plants of this section purchased 2,042,912,000 kw-hr. from central station companies, making a total energy consumption during 1924 of 2,578,852,000 kw-hr. of which 79.2 per cent was purchased from central station lines and 20.8 per cent was generated in private plants. This is the lowest percentage of privately generated energy reported by any section of the country, other sections reporting privately generated energy as follows: New England 41.6 per cent, Middle Atlantic 37.3 per cent, North Central 42.2 per cent and the Southern States 33.5 per cent.

There are 125,998 electric motors, with a combined rating of 1,826,123 hp., installed in the industrial plants of the Western States. Of the total number of motors 69.7 per cent are alternating current and 30.3 per cent are direct current machines. Approximately 49 per cent of the total number of motors are under 5 hp.

A total of eighteen different distribution voltages was reported and one company reported the transmission of energy at 33,000 volts. Five different frequencies were reported. These figures would indicate that there is still a large field open for the standardization of electrical equipment in the Western States.

A study of the industries operating in the Western States brings out the diversity in the central station industrial load. There are three industrial groups in the section as a whole with an aggregate primary power totaling 1,672,000 hp. or 63 per cent of the total installed industrial power of the section, these industries in their order of importance being the lumber and allied products, food and kindred products and metal and metal products other than iron and steel. The food industry is common to both the Mountain and Pacific States, but the metals industry is confined very largely to the Mountain States, and the lumber industry is confined very largely to the Pacific States. There are two industries, the metals and the lumber industries which consume over five hundred million kilowatt hours annually. In one of these, the lumber industry, the private plant is the predominating factor.

The lumber industry has a total installed power of 874,664 hp. or approximately one-third of the

as of January 1, 1924 and Energy Consumed by Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
7,716	251	65.0	1,765,838	1,422,362	343,476	151,473	136,282	15,191	71,440	1,042,716	29,444	270,151	48,568	151,691
0,380	10	74.0	237,367	226,970	10,397	4,907	4,907	0	6,940	78,549	7,910	39,145	7,200	34,137
0,690	53	82.2	208,732	186,350	22,382	21,568	17,888	3,680	12,540	186,808	4,390	40,960	11,945	31,805
1,238	0	96.0	85,095	85,095	0	0	0	0	961	33,938	1,867	42,450	544	1,835
1,874	3	89.5	7,652	6,642	1,010	860	0	860	115	1,554	744	4,576	315	946
8,000	143	37.8	489,300	236,700	252,600	106,650	100,000	6,650	13,910	370,025	527	13,020	4,590	16,215
4,103	2	95.5	65,330	65,240	90	70	0	70	3,260	23,947	7,610	53,230	5,112	10,840
620	1	93.5	35,997	35,972	25	14	9	5	384	13,761	165	5,194	294	482
0	0	100.0	677	677	0	0	0	0	48	774	14	60	22	33
8,170	15	67.0	288,520	238,600	49,920	13,390	11,389	2,001	2,517	58,675	3,255	46,398	1,953	4,870
3,088	2	84.7	37,547	37,190	357	300	287	13	1,081	29,812	815	10,845	1,077	2,593
166	0	98.4	35,227	35,227	0	0	0	0	973	16,934	111	575	473	1,631
5,270	12	93.8	90,854	86,685	4,169	1,795	22	1,773	11,330	94,029	1,249	7,845	6,224	20,045
1,280	4	89.7	41,500	40,690	810	372	298	74	4,214	19,099	19	123	2,821	10,158
0	0	100.0	856	856	0	0	0	0	67	388	25	12	51	121
706	3	98.5	65,098	64,693	405	155	90	65	8,491	72,865	146	4,100	4,414	12,626
2,041	3	95.7	76,086	74,775	1,311	1,392	1,392	0	4,609	41,558	597	1,510	1,533	3,354

total installed power of the entire section. According to the reports received in this survey and the available government data, these mills are 36.2 per cent electrified. This is a high degree of electrification when it is remembered that these mills are located in isolated places for the most part. During 1924 these mills consumed a total of 517,881,000 kw-hr. of electrical energy, of which 47.9 per cent was purchased from central station companies and 52.2 per cent was generated in private plants. The rating of the generators in these plants totals 113,950 kva. or sufficient capacity to supply a modern city of 370,000 population with light, heat, power and transportation.

The food industry, the manufacturing industry second in importance in the Western States, is

Table III—Distribution of the Industrial Power Load in the Mountain States

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	777,745	278,041	79,206	23,192	9,212	388,094	125,162	753	206,615
Chemicals and allied products	36,647	12,459	4,460	1,525	500	17,703	9,817	61	16,852
Food and kindred products	143,836	77,450	4,265	4,662	3,271	54,188	20,476	235	51,666
Iron and steel and their products, not including machinery	48,672	42,027	2,828	0	0	3,817	10,728	58	19,605
Leather and its finished products	1,306	575	350	0	0	381	34	9	1,045
Lumber and allied products	79,797	57,733	11,367	1,848	135	8,714	13,654	161	42,836
Machinery	11,265	130	20	47	0	11,068	224	2	225
Metal and metal products other than iron and steel	359,294	62,920	53,617	13,050	4,574	225,133	60,332	107	54,785
Musical instruments and phonographs	0	0	0	0	0	0	0	0	0
Paper and printing	10,112	670	33	124	33	9,252	212	2	590
Railroad repair shops	43,008	14,194	1,308	358	75	27,153	9,602	19	6,520
Rubber products	2,455	0	0	0	0	2,455	0	0	0
Stone, glass, and clay products	36,411	8,839	598	1,556	484	24,934	55	88	10,848
Textiles and their products	2,211	655	350	0	50	1,156	18	7	1,285
Tobacco manufacturers	9	0	0	0	0	9	0	0	0
Transportation equipment, air, land and water	900	50	0	10	0	840	0	1	38
Miscellaneous industries	1,742	339	10	12	90	1,291	10	3	320

Table IV—Distribution of the Industrial Power Load in the Mountain Pacific States

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	2,664,687	925,761	180,599	51,098	59,304	1,447,925	378,198	2,784	734,331
Chemicals and allied products	195,887	45,566	11,497	7,137	991	130,246	14,968	199	57,232
Food and kindred products	419,802	137,703	8,349	9,323	6,916	257,511	44,921	419	92,356
Iron and steel and their products, not including machinery	128,201	44,579	3,164	253	0	80,205	10,728	62	20,843
Leather and its finished products	8,290	2,159	422	6	0	5,703	842	24	2,919
Lumber and its allied products	874,664	563,298	91,717	14,709	10,915	194,025	211,388	1,635	440,836
Machinery	92,132	1,330	1,550	1,072	41	88,139	330	43	4,328
Metal and metal products other than iron and steel	379,596	63,937	53,915	13,094	4,575	244,075	60,345	109	55,405
Musical instruments and phonographs	834	0	0	0	0	834	0	0	0
Paper and printing	161,416	28,151	6,083	323	30,668	96,191	18,346	97	28,760
Railroad repair shops	91,066	21,542	1,308	707	75	67,434	9,978	27	9,608
Rubber products	20,274	115	195	0	0	19,964	0	1	166
Stone, Clay and glass products	142,157	12,995	661	2,975	3,389	122,137	4,726	131	16,118
Textiles and their products	23,685	1,195	808	43	1,636	20,003	393	14	2,565
Tobacco manufacturers	517	0	0	0	0	517	0	0	0
Transportation equipment, air, land and water	78,648	1,034	74	209	5	77,326	479	5	834
Miscellaneous industries	47,518	2,154	406	1,247	93	43,615	754	18	2,361

Table V—Distribution of the Industrial Power Load in California as of Jan

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	971,315	186,469	33,459	15,751	10,724	724,912	88,103	622	153,823
Chemicals and allied products	136,904	27,118	5,460	5,277	208	98,841	4,514	110	32,400
Food and kindred products	198,030	48,431	3,760	3,279	158	142,402	23,645	149	33,000
Iron and steel and their products, not including machinery	62,459	2,161	297	253	0	59,748	0	3	1,070
Leather and its finished products	5,795	1,377	68	6	0	4,344	780	13	1,635
Lumber and its allied products	207,469	93,743	16,900	2,856	7,259	86,711	52,080	254	68,500
Machinery	60,851	870	1,405	951	41	57,584	106	34	3,420
Metal and metal products other than iron and steel	10,008	200	265	10	1	9,532	0	1	220
Musical instruments and phonographs	511	0	0	0	0	511	0	0	0
Paper and printing	40,816	4,544	4,160	178	3,046	28,888	5,240	25	7,310
Railroad repair shops	31,610	5,331	0	349	0	25,930	260	5	2,240
Rubber products	16,015	115	195	0	0	15,705	0	1	166
Stone, clay, and glass products	84,853	1,196	53	1,297	5	82,302	334	13	1,560
Textiles and their products	15,652	260	458	10	6	14,918	0	5	920
Tobacco manufacturers	502	0	0	0	0	502	0	0	0
Transportation equipment, air, land and water	58,392	273	72	105	0	57,942	412	1	262
Miscellaneous industries	41,448	850	366	1,180	0	39,052	732	8	1,120

71.5 per cent electrified. These factories consumed a total of 276,997,000 kw-hr. of electrical energy during 1924 of which 85 per cent was purchased from central station companies. Only 41,125,000 kw-hr. were generated by private generating plants, although there are 118 private generating plants in the section. Over 70 per cent of the electric motors installed in these food factories are under 5 hp.

The metals industry is the third largest industry of the section so far as installed power is concerned, but almost 95 per cent of this power is located in the Mountain States. The reports received in the survey indicate that this industry consumed more electrical energy than any other industry operating in the section with a total of 577,568,000 kw-hr. The metals industry consumed an average of 1,900

as of January 1, 1924 and Energy Consumed by Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
138	120,386	65.5	813,014	620,550	192,464	111,469	80,586	30,883	16,340	382,226	8,774	131,030	12,929	37,453
10	10,133	76.0	55,692	35,858	19,834	9,386	9,370	16	1,632	18,411	1,841	9,109	1,683	7,963
65	19,524	51.3	68,265	49,522	18,743	18,090	15,007	3,083	4,107	61,218	1,438	13,446	3,914	10,414
2	7,400	23.1	16,266	4,256	11,970	6,850	4,025	2,825	185	6,457	357	8,088	106	353
1	39	32.2	519	477	42	36	0	36	13	106	52	309	29	85
17	7,889	20.8	28,581	11,133	17,448	7,300	6,838	462	813	21,606	34	762	332	1,174
2	157	99.5	9,540	9,350	190	145	0	145	485	3,544	1,131	7,748	761	1,615
13	66,920	80.3	541,571	426,886	114,685	61,995	38,055	23,940	6,205	222,727	1,995	62,738	4,336	10,531
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	168	93.0	25,930	25,350	580	156	133	23	255	8,583	168	881	186	398
20	8,092	81.8	33,920	25,054	8,866	7,452	7,125	327	806	10,142	1,541	26,613	658	1,861
0	0	100.0	4,935	4,935	0	0	0	0	69	2,168	32	287	72	167
2	24	68.6	22,278	22,229	49	22	0	22	1,418	24,239	155	750	675	2,367
1	19	53.2	2,533	2,494	39	18	14	4	143	1,074	18	100	74	236
0	0	100.0	16	16	0	0	0	0	4	9	0	0	4	9
0	0	93.4	711	711	0	0	0	0	29	641	12	199	12	39
1	21	75.3	2,297	2,279	18	19	19	0	176	1,301	0	0	87	244

as of January 1, 1924 and Energy Consumed by Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
389	283,804	65.0	2,578,852	2,042,912	535,940	262,942	216,868	46,074	87,780	1,424,942	38,218	401,181	61,497	189,144
20	15,428	74.3	293,059	262,828	30,231	14,293	14,277	16	8,572	96,960	9,751	48,254	8,883	42,100
118	42,800	71.5	276,997	235,872	41,125	39,658	32,895	6,763	16,647	248,026	5,828	54,406	15,859	42,219
2	7,400	68.4	101,321	89,351	11,970	6,850	4,025	2,825	1,146	40,395	2,224	50,538	650	2,188
4	966	80.4	8,171	7,119	1,052	896	0	896	128	1,660	796	4,885	344	1,031
160	122,939	36.2	517,881	247,833	270,048	113,950	106,838	7,112	14,723	391,631	561	13,782	4,922	17,389
4	232	95.8	74,870	74,590	280	215	0	215	3,745	27,491	8,741	60,978	5,873	12,455
14	66,935	82.1	577,568	462,858	114,710	62,009	38,064	23,945	6,589	236,488	2,160	67,932	4,630	11,013
0	0	100.0	677	677	0	0	0	0	48	774	14	60	22	33
19	14,613	68.6	314,450	263,950	50,500	13,546	11,522	2,024	2,772	67,258	3,423	47,279	2,139	5,268
22	8,416	83.3	71,467	62,244	9,223	7,752	7,412	340	1,887	39,954	2,356	37,458	1,735	4,454
0	0	98.6	40,162	40,162	0	0	0	0	1,042	19,102	143	862	545	1,798
14	1,964	87.3	113,132	108,914	4,218	1,817	22	1,795	12,748	118,268	1,404	8,595	6,899	22,409
5	419	86.3	44,033	43,184	849	390	312	78	4,357	20,173	37	223	2,895	10,394
0	0	100.0	872	872	0	0	0	0	71	397	25	120	55	130
3	167	98.4	65,809	65,404	405	155	90	65	8,520	73,506	158	4,299	4,426	12,615
4	1,525	95.0	78,383	77,054	1,329	1,411	1,411	0	4,785	42,859	597	1,510	1,620	3,598

January 1, 1924 and Energy Consumed by the Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
89	64,289	81.3	1,053,952	939,031	114,921	59,583	52,607	6,976	51,553	627,728	21,765	185,287	36,525	116,128
7	4,640	75.5	208,410	199,300	9,110	4,300	4,300	0	6,100	68,955	6,950	34,400	6,325	30,000
31	22,500	83.2	152,150	130,500	21,650	20,850	17,290	3,560	9,140	136,197	3,200	29,850	8,710	23,200
0	0	95.7	66,550	66,550	0	0	0	0	752	26,548	1,460	33,200	425	1,435
2	895	90.5	6,395	5,420	975	830	0	830	96	1,300	622	3,824	263	790
28	30,050	56.2	177,350	110,800	66,550	27,850	26,100	1,750	5,040	134,080	190	4,711	1,660	5,875
2	75	94.8	48,840	48,750	90	70	0	70	2,435	17,890	5,690	39,800	3,820	8,100
0	0	95.2	18,100	18,100	0	0	0	0	193	6,922	83	2,610	148	125
0	0	100.0	415	415	0	0	0	0	14	463	9	48	11	23
9	4,150	80.8	93,570	79,200	14,370	3,850	3,275	575	747	9,410	1,430	24,718	608	1,720
1	278	82.7	24,190	23,950	240	202	193	9	736	23,130	338	3,060	767	1,775
0	0	98.1	31,600	31,600	0	0	0	0	890	15,235	96	470	423	1,480
5	138	97.0	73,698	73,400	298	128	2	126	9,960	75,610	1,100	7,026	5,530	17,700
0	0	95.3	32,200	32,200	0	0	0	0	3,390	14,918	0	0	2,285	9,150
0	0	100.0	846	846	0	0	0	0	65	382	25	120	50	120
2	143	99.5	49,348	49,000	348	133	77	56	7,780	58,354	0	0	4,140	11,650
2	1,480	97.7	70,290	69,000	1,290	1,370	1,370	0	4,215	38,334	572	1,450	1,360	2,985

kw-hr. per horsepower of motors installed, a very high use of energy when compared with 1,280 kw-hr. and 920 kw-hr. per motor horsepower in the lumber and food industries respectively. Private generating plants supplied 114,710,000 kw-hr. or 19.8 per cent of the total amount of energy consumed by the metals industry. The fact that the steam turbine installation in the private power plants totals 53,915 hp. would indicate that the private plants in the metal mills of these states embody engineering equipment of a high and efficient type.

Of the eleven states comprising the Mountain-Pacific section, California, the state with the largest power installation, reported the second highest degree of electrification, 81.3 per cent, being out-

Table VI—Distribution of the Industrial Power Load in Washington as of

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	593,330	318,000	41,420	10,498	6,211	217,201	103,211	997	264,970
Chemicals and allied products	16,920	4,465	677	335	268	11,175	489	18	5,120
Food and kindred products	44,849	7,107	210	799	899	35,834	439	21	4,630
Iron and steel and their products, not including machinery	15,010	391	39	0	0	14,580	0	1	168
Leather and its finished products	484	86	4	0	0	394	28	1	102
Lumber and its allied products	379,324	284,631	38,400	9,053	337	46,903	95,298	870	235,000
Machinery	13,786	295	125	71	0	13,295	0	6	630
Metal and metal products other than iron and steel	9,601	817	33	0	0	8,751	0	1	400
Musical instruments and phonographs	323	0	0	0	0	323	0	0	0
Paper and printing	63,993	15,805	1,890	11	1,802	44,485	2,612	50	14,880
Railroad repair shops	11,326	1,387	0	0	0	9,939	116	2	583
Rubber products	650	0	0	0	0	650	0	0	0
Stone, clay, and glass products	15,831	2,151	10	95	2,900	10,675	4,162	22	2,700
Textiles and their products	1,448	0	0	5	0	1,443	0	0	0
Tobacco manufacturers	1	0	0	0	0	1	0	0	0
Transportation equipment, air, land and water	17,683	435	2	82	5	17,159	67	2	332
Miscellaneous industries	2,101	430	30	47	0	1,594	0	3	425

Table VII—Distribution of the Industrial Power Load in Oregon as of

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	322,297	143,251	26,514	1,657	33,157	117,718	61,722	412	108,923
Chemicals and allied products	5,416	1,524	1,350	0	15	2,527	148	10	2,860
Food and kindred products	33,087	4,715	114	583	2,588	25,087	361	14	3,060
Iron and steel and their products, not including machinery	2,060	0	0	0	0	2,060	0	0	0
Leather and its finished products	705	121	0	0	0	584	0	1	137
Lumber and its allied products	208,074	127,191	25,050	952	3,184	51,697	50,356	350	94,500
Machinery	6,230	35	0	3	0	6,192	0	1	53
Metal and metal products other than iron and steel	693	0	0	34	0	659	13	0	0
Musical instruments and phonographs	0	0	0	0	0	0	0	0	0
Paper and printing	46,495	7,132	0	10	25,787	13,566	10,282	20	5,980
Railroad repair shops	5,042	630	0	0	0	4,412	0	1	265
Rubber products	1,154	0	0	0	0	1,154	0	0	0
Stone, clay, and glass products	5,062	809	0	27	0	4,226	175	8	1,010
Textiles and their products	4,374	280	0	28	1,580	2,486	375	2	360
Tobacco manufacturers	5	0	0	0	0	5	0	0	0
Transportation equipment, air, land and water	1,673	276	0	12	0	1,385	0	1	202
Miscellaneous industries	2,227	538	0	8	3	1,678	12	4	496

Table VIII—Distribution of the Industrial Power Load in Montana as of

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	190,516	27,852	2,248	1,466	4,511	154,439	6,774	60	17,268
Chemicals and allied products	3,498	433	52	0	0	3,013	17	2	485
Food and kindred products	13,571	3,894	206	902	453	8,116	1,069	12	2,500
Iron and steel and their products, not including machinery	26	0	0	0	0	26	0	0	0
Leather and its finished products	7	0	0	0	0	7	0	0	0
Lumber and its allied products	15,631	12,940	960	515	0	1,216	2,579	32	8,620
Machinery	518	0	0	0	0	518	0	0	0
Metal and metal products other than iron and steel	140,525	7,900	1,000	0	3,974	127,651	1,550	8	4,180
Musical instruments and phonographs	0	0	0	0	0	0	0	0	0
Paper and printing	1,803	0	0	48	9	1,746	1	0	0
Railroad repair shops	7,925	2,415	0	0	75	5,435	1,528	3	1,010
Rubber products	0	0	0	0	0	0	0	0	0
Stone, clay, and glass products	6,839	270	30	1	0	6,538	30	3	775
Textiles and their products	12	0	0	0	0	12	0	0	0
Tobacco manufacturers	5	0	0	0	0	5	0	0	0
Transportation equipment, air, land and water	25	0	0	0	0	25	0	0	0
Miscellaneous industries	131	0	0	0	0	131	0	0	0

distanced only by Montana which reports industrial electrification of 83.9 per cent. The high figure reported for Montana is due mainly to the high electrification, 92.1 per cent, of the metals industry, the leading industry of the state. California has a power installation of 971,315 hp. of which only 64,289 hp. is in private electric generating plants. The manufacturing plants of California consumed a total of 1,053,952,000 kw-hr. of electrical energy during 1924, of which 81.8 per cent was purchased from central station companies. It must be remembered in this connection that this consumption of energy does not include the energy consumed by the mining industry, or the consumption for irrigation purposes. While the 89 private plants of the state generated 114,921,000 kw-hr. during

January 1, 1924 and Energy Consumed by the Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
111	60,892	46.9	456,852	322,638	134,214	56,425	51,250	5,175	12,058	268,810	4,984	51,602	7,380	22,324
1	505	69.0	23,558	22,570	988	467	467	0	690	7,804	780	3,860	715	3,380
14	420	80.8	33,252	32,850	402	388	322	66	2,000	29,743	700	6,530	1,900	5,060
0	0	97.1	16,250	16,250	0	0	0	0	183	6,480	357	8,100	104	350
1	32	88.0	527	492	35	30	0	30	8	106	51	316	22	66
83	56,000	27.1	181,650	59,900	121,750	51,900	48,700	3,200	5,160	137,365	196	4,836	1,705	6,020
0	0	96.2	11,250	11,250	0	0	0	0	563	4,135	1,310	9,160	882	1,870
0	0	91.2	16,620	16,620	0	0	0	0	177	6,351	76	2,400	135	330
0	0	100.0	262	262	0	0	0	0	34	311	5	12	11	10
4	2,075	72.9	129,150	122,000	7,150	1,920	1,634	286	1,250	42,717	825	4,380	920	1,950
1	106	88.6	9,277	9,160	117	98	94	4	221	2,785	420	7,270	180	518
0	0	100.0	1,307	1,307	0	0	0	0	18	580	8	70	19	43
6	1,730	78.3	13,235	9,520	3,715	1,600	20	1,580	840	14,392	91	445	400	1,400
0	0	99.6	3,120	3,120	0	0	0	0	174	1,320	19	123	97	310
0	0	100.0	2	2	0	0	0	0	1	1	0	0	1	1
1	24	97.0	14,577	14,520	57	22	13	9	525	13,126	146	4,100	174	696
0	0	75.8	2,815	2,815	0	0	0	0	214	1,594	0	0	115	320

January 1, 1924 and Energy Consumed by the Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
51	38,237	48.4	255,034	160,693	94,341	35,465	32,425	3,040	7,829	146,178	2,695	33,262	4,663	13,239
2	150	49.5	5,399	5,100	299	140	140	0	150	1,790	180	885	160	757
8	356	76.8	23,330	23,000	330	330	276	54	1,400	20,868	490	4,580	1,335	3,545
0	0	100.0	2,295	2,295	0	0	0	0	26	910	50	1,150	15	50
0	0	82.8	730	730	0	0	0	0	11	148	71	436	30	90
32	29,000	38.8	130,300	66,000	64,300	26,900	25,200	1,700	3,710	98,580	141	3,473	1,225	4,320
0	0	99.5	5,240	5,240	0	0	0	0	262	1,922	610	4,270	410	870
1	15	97.4	1,277	1,252	25	14	9	5	14	488	6	184	11	27
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
2	8,220	46.8	65,800	37,400	28,400	7,620	6,480	1,140	520	6,548	1,000	17,300	425	1,200
0	0	87.6	4,080	4,080	0	0	0	0	124	3,897	57	515	130	300
0	0	100.0	2,320	2,320	0	0	0	0	65	1,119	7	35	31	108
1	72	84.9	3,921	3,765	156	67	0	67	530	4,027	58	374	294	945
4	400	66.0	6,180	5,370	810	372	298	74	650	2,861	0	0	439	698
0	0	100.0	8	8	0	0	0	0	1	5	0	0	0	0
0	0	82.7	1,173	1,173	0	0	0	0	186	1,385	0	0	100	280
1	24	26.4	2,981	2,960	21	22	22	0	180	1,630	25	60	58	49

January 1, 1924 and Energy Consumed by the Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
17	5,541	83.9	282,658	273,960	8,698	5,134	4,205	929	4,061	117,281	1,938	43,932	3,103	8,345
1	17	86.7	6,124	6,090	34	16	16	0	180	2,030	202	1,000	185	875
4	1,020	67.3	8,415	7,435	980	945	785	160	505	7,535	177	1,650	481	1,280
0	0	100.0	29	29	0	0	0	0	1	12	1	14	0	0
0	0	100.0	9	9	0	0	0	0	1	2	1	5	1	2
4	1,490	17.3	4,848	1,553	3,295	1,380	1,290	90	138	3,665	6	130	46	162
0	0	100.0	438	438	0	0	0	0	26	192	61	326	41	87
2	1,720	92.1	245,450	242,500	2,950	1,595	980	615	2,615	93,801	1,125	35,400	2,000	4,860
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	96.9	4,787	4,785	2	1	1	0	47	1,584	31	163	34	73
4	1,280	84.7	6,420	5,010	1,410	1,185	1,133	52	153	1,923	292	5,040	125	352
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
1	13	95.8	5,852	5,825	27	12	0	12	372	6,371	40	197	177	620
0	0	100.0	25	25	0	0	0	0	2	11	1	1	1	1
0	0	100.0	9	9	0	0	0	0	2	5	0	0	2	5
0	0	100.0	21	21	0	0	0	0	1	19	1	6	0	0
0	0	100.0	231	231	0	0	0	0	18	131	0	0	10	28

1924, yet only 58 per cent of this amount was generated by the 28 plants of one industry, the lumber industry. It would appear, therefore, that the central station industry in California has made large progress toward the elimination of the private generating plants.

Washington, the second most important state of the section in so far as power is concerned, is only 46.9 per cent electrified. This comparatively low degree of electrification is due to the fact that the lumber industry, which accounts for two-thirds of the installed power of the state, is only 27.1 per cent electrified. In fact, this is the only industry in the state which is under 69 per cent electrified. The state of Washington has a power installation of 593,330 hp., of which 60,892 hp. is in private electric generating plants. The manufacturing plants of the state consumed a total of

Table IX—Distribution of the Industrial Power Load in Idaho as of

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	72,146	37,005	9,722	1,714	429	23,276	11,064	117	29,359
Chemicals and allied products	431	390	0	3	0	38	0	2	390
Food and kindred products	15,388	5,840	261	143	389	8,755	2,246	18	3,860
Iron and steel and their products, not including machinery	10	0	0	0	0	10	0	0	0
Leather and its finished products	8	0	0	0	0	8	0	0	0
Lumber and its allied products	43,054	29,570	9,461	1,069	40	2,914	8,818	90	24,200
Machinery	324	0	0	0	0	324	0	0	0
Metal and metal products other than iron and steel	4,160	0	0	0	0	4,160	0	0	0
Musical instruments and phonographs	0	0	0	0	0	0	0	0	0
Paper and printing	512	0	0	9	0	503	0	0	0
Railroad repair shops	6,415	690	0	0	0	5,725	0	1	290
Rubber products	0	0	0	0	0	0	0	0	0
Stone, clay, and glass products	1,664	465	0	480	0	719	0	5	581
Textiles and their products	48	0	0	0	0	48	0	0	0
Tobacco manufacturers	0	0	0	0	0	0	0	0	0
Transportation equipment, air, land and water	91	50	0	10	0	31	0	1	38
Miscellaneous industries	41	0	0	0	0	41	0	0	0

Table X—Distribution of the Industrial Power Load in Wyoming as of

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	23,959	10,087	3,962	1,893	98	7,919	5,107	47	11,988
Chemicals and allied products	10,374	5,130	3,375	1,017	0	852	4,606	29	8,470
Food and kindred products	5,133	2,695	408	808	98	1,124	501	9	1,960
Iron and steel and their products, not including machinery	0	0	0	0	0	0	0	0	0
Leather and its finished products	0	0	0	0	0	0	0	0	0
Lumber and its allied products	889	464	29	35	0	361	0	2	306
Machinery	149	0	0	0	0	149	0	0	0
Metal and metal products other than iron and steel	1	0	0	0	0	1	0	0	0
Musical instruments and phonographs	0	0	0	0	0	0	0	0	0
Paper and printing	406	3	0	13	0	390	0	0	0
Railroad repair shops	5,626	1,420	0	20	0	4,186	0	2	596
Rubber products	0	0	0	0	0	0	0	0	0
Stone, clay, and glass products	1,331	375	150	0	0	806	0	5	656
Textiles and their products	46	0	0	0	0	46	0	0	0
Tobacco manufacturers	0	0	0	0	0	0	0	0	0
Transportation equipment, air, land and water	4	0	0	0	0	4	0	0	0
Miscellaneous industries	0	0	0	0	0	0	0	0	0

Table XI—Distribution of the Industrial Power Load in Colorado as of

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	176,076	104,057	5,276	2,146	666	63,931	28,846	288	65,795
Chemicals and allied products	14,661	4,670	280	68	0	9,643	3,906	17	4,930
Food and kindred products	62,359	44,056	1,920	1,934	658	13,791	13,086	131	29,030
Iron and steel and their products, not including machinery	46,123	41,595	2,560	0	0	1,968	10,728	57	19,300
Leather and its finished products	313	0	0	0	0	313	0	0	0
Lumber and its allied products	5,047	2,924	125	83	0	1,915	0	7	1,800
Machinery	6,856	130	20	35	0	6,671	224	2	225
Metal and metal products other than iron and steel	6,010	1,090	60	0	0	4,860	0	2	540
Musical instruments and phonographs	0	0	0	0	0	0	0	0	0
Paper and printing	5,430	667	33	14	8	4,708	187	2	500
Railroad repair shops	8,039	2,617	0	8	0	5,414	705	3	1,100
Rubber products	2,455	0	0	0	0	2,455	0	0	0
Stone, clay, and glass products	16,484	6,094	268	4	0	10,118	0	64	7,950
Textiles and their products	699	40	0	0	0	659	0	1	0
Tobacco manufacturers	3	0	0	0	0	3	0	0	0
Transportation equipment, air, land and water	717	0	0	0	0	717	0	0	0
Miscellaneous industries	880	174	10	0	0	696	10	2	10

456,852,000 kw-hr. of electrical energy in 1924, of which 71 per cent was purchased from central station companies. There are 17,042 motors installed in the manufacturing plants of Washington of which 43 per cent are under 5 hp.

Oregon is another state with a predominating industry, lumber, which is of a low degree of electrification. Industry as a whole in Oregon is 48.4 per cent electrified.

A Large Potential Industrial Power Field Is Yet to Be Developed

In the West as in the remainder of the nation, the future holds large potentialities for development. But the future load growth of the industry will proceed along lines different from the past. Up until the last year the central station has confined its load building efforts very largely to the taking on of new customers. The customer satur-

January 1, 1924 and Energy Consumed by the Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
14	7,240	42.3	40,844	27,514	13,330	6,700	6,065	635	1,327	26,337	558	8,003	947	2 651
0	0	8.8	77	77	0	0	0	0	3	25	3	13	3	13
5	2,150	70.9	10,080	8,020	2,060	1,990	1,650	340	605	9,021	212	1,980	577	1,535
0	0	100.0	11	11	0	0	0	0	1	4	1	6	1	2
0	0	100.0	10	10	0	0	0	0	1	2	1	6	1	2
9	5,090	18.6	14,990	3,720	11,270	4,710	4,415	295	426	11,332	17	400	141	498
0	0	100.0	274	274	0	0	0	0	14	100	32	224	22	46
0	0	100.0	7,900	7,900	0	0	0	0	84	3,016	36	1,144	64	156
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	98.2	1,380	1,380	0	0	0	0	14	456	9	47	10	21
0	0	89.3	5,280	5,280	0	0	0	0	125	1,575	240	4,150	102	289
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	42.6	640	640	0	0	0	0	41	697	5	22	20	70
0	0	100.0	104	104	0	0	0	0	6	44	1	4	3	10
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	34.1	26	26	0	0	0	0	1	24	1	7	0	0
0	0	100.0	72	72	0	0	0	0	6	41	0	0	3	9

January 1, 1924 and Energy Consumed by the Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
10	5,230	54.9	18,855	9,096	9,759	4,845	4,770	75	590	7,716	601	5,310	544	2,165
5	4,750	54.0	11,020	1,720	9,300	4,400	4,400	0	323	3,650	365	1,808	334	1,580
5	480	31.3	1,489	1,030	459	445	370	75	90	1,333	31	292	85	227
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	40.6	461	461	0	0	0	0	13	349	1	12	4	16
0	0	100.0	126	126	0	0	0	0	7	46	15	103	10	21
0	0	100.0	2	2	0	0	0	0	1	1	0	0	1	1
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	96.0	1,070	1,070	0	0	0	0	11	354	7	36	8	17
0	0	74.4	3,865	3,865	0	0	0	0	92	1,156	175	3,030	75	212
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	60.6	720	720	0	0	0	0	46	782	5	24	22	77
0	0	100.0	99	99	0	0	0	0	6	42	1	4	3	10
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	100.0	3	3	0	0	0	0	1	3	1	1	2	4
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0

January 1, 1924 and Energy Consumed by the Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
47	24,858	50.4	120,495	87,254	33,241	23,018	18,019	4,999	4,014	64,301	2,950	28,476	3,553	11,213
2	4,040	93.5	27,470	19,570	7,900	3,740	3,730	10	803	9,064	906	4,485	828	3,920
33	12,500	42.2	24,650	12,650	12,000	11,580	9,605	1,975	1,480	22,032	518	4,845	1,410	3,750
2	7,400	20.3	14,163	2,193	11,970	6,850	4,025	2,825	160	5,636	310	7,060	91	305
0	0	100.0	392	392	0	0	0	0	6	79	38	234	16	48
0	0	38.0	2,450	2,450	0	0	0	0	70	1,850	3	65	23	82
2	157	99.6	5,840	5,650	190	145	0	145	292	2,140	680	4,755	457	970
0	0	81.9	9,230	9,230	0	0	0	0	98	3,530	43	1,330	75	184
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
2	148	89.4	13,412	12,900	512	137	117	20	130	4,440	86	455	95	203
5	592	74.8	5,651	5,000	651	547	523	24	134	1,689	256	4,430	109	310
0	0	100.0	4,935	4,935	0	0	0	0	69	2,168	32	287	72	167
0	0	61.5	9,020	9,020	0	0	0	0	575	9,815	62	303	273	955
0	0	94.3	1,422	1,422	0	0	0	0	79	603	9	56	44	141
0	0	100.0	5	5	0	0	0	0	1	3	0	0	1	3
0	0	100.0	607	607	0	0	0	0	22	546	7	171	8	32
1	21	81.5	1,248	1,230	18	19	19	0	95	706	0	0	51	143

ation is nearing its economic limit, and must soon develop in accordance with the normal growth in population and industry. The new load of the future must result from the intensive development in the use of electrical energy per customer both in the home and in industry. The refrigerator, clothes washer, range, ironer, vacuum cleaner, etc., better illumination of the home, the placing of radio sets on the central station lines, all point the way along which the industry must proceed in the future. The future domestic load will become more and more a small power load as the housewife becomes educated to the use of labor-saving devices in the home.

Likewise, the industrial load will change in the future. Approximately 65 per cent of national industry is now electrified. There are 622,000 industrial power customers in the country at the

Table XII—Distribution of the Industrial Power Load in Arizona as of

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	128,531	42,193	43,146	13,568	60	29,564	45,078	98	42,235
Chemicals and allied products	1,976	732	362	22	0	860	485	4	1,090
Food and kindred products	8,896	4,236	25	147	60	4,528	316	12	2,700
Iron and steel and their products, not including machinery	173	0	0	0	0	173	0	0	0
Leather and its finished products	4	0	0	0	0	4	0	0	0
Lumber and its allied products	6,206	5,695	337	0	0	174	2,051	14	3,740
Machinery	961	0	0	0	0	961	0	0	0
Metal and metal products other than iron and steel	106,734	30,280	42,352	13,050	0	21,052	41,743	66	34,150
Musical instruments and phonographs	0	0	0	0	0	0	0	0	0
Paper and printing	517	0	0	18	0	499	0	0	0
Railroad repair shops	2,476	1,250	70	260	0	896	483	2	555
Rubber products	0	0	0	0	0	0	0	0	0
Stone, clay, and glass products	457	0	0	59	0	398	0	0	0
Textiles and their products	4	0	0	0	0	4	0	0	0
Tobacco manufacturers	0	0	0	0	0	0	0	0	0
Transportation equipment, air, land and water	2	0	0	0	0	2	0	0	0
Miscellaneous industries	25	0	0	12	0	13	0	0	0

Table XIII—Distribution of the Industrial Power Load in Utah as of

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	141,671	31,405	6,761	2,505	2,508	100,492	10,026	88	22,731
Chemicals and allied products	4,388	948	368	25	500	2,547	803	5	1,310
Food and kindred products	31,946	13,814	1,445	196	1,278	15,213	2,991	44	9,650
Iron and steel and their products, not including machinery	2,340	432	268	0	0	1,640	0	1	305
Leather and its finished products	957	575	350	0	0	32	34	9	1,045
Lumber and its allied products	1,645	195	45	0	95	1,310	0	1	150
Machinery	2,241	0	0	0	0	2,241	0	0	0
Metal and metal products other than iron and steel	84,362	13,150	3,805	0	0	67,407	4,857	16	7,965
Musical instruments and phonographs	0	0	0	0	0	0	0	0	0
Paper and printing	1,011	0	0	4	11	996	0	0	0
Railroad repair shops	5,135	1,441	0	0	0	3,694	1,323	2	615
Rubber products	0	0	0	0	0	0	0	0	0
Stone, clay, and glass products	5,688	235	130	280	484	4,559	0	4	456
Textiles and their products	1,402	615	350	0	50	387	18	6	1,235
Tobacco manufacturers	1	0	0	0	0	1	0	0	0
Transportation equipment, air, land and water	55	0	0	0	0	55	0	0	0
Miscellaneous industries	500	0	0	0	90	410	0	0	0

Table XIV—Distribution of the Industrial Power Load in Nevada as of

Industry	Total Primary Horsepower	Primary Horsepower Owned by Establishments Reporting				Electric Motors Run by Purchased Energy, Hp.	Electric Motors Run by Energy Generated in Private Plants, Hp.	Boilers	
		Steam Engines (Not Turbines)	Steam Turbines	Internal-Combustion Engines	Water Turbines			Number	Hp.
All industries	27,983	13,638	6,683	937	630	6,095	14,234	27	10,080
Chemicals and allied products	255	35	20	0	0	200	0	1	55
Food and kindred products	2,462	499	0	130	25	1,808	31	2	315
Iron and steel and their products, not including machinery	0	0	0	0	0	0	0	0	0
Leather and its finished products	6	0	0	0	0	6	0	0	0
Lumber and its allied products	820	235	140	0	0	445	0	1	230
Machinery	176	0	0	12	0	164	0	0	0
Metal and metal products other than iron and steel	17,500	10,500	6,400	0	600	0	12,182	15	7,950
Musical instruments and phonographs	0	0	0	0	0	0	0	0	0
Paper and printing	178	0	0	3	5	170	0	0	0
Railroad repair shops	3,780	1,809	103	70	0	1,798	2,021	2	805
Rubber products	0	0	0	0	0	0	0	0	0
Stone, clay, and glass products	2,800	560	20	722	0	1,498	0	6	720
Textiles and their products	0	0	0	0	0	0	0	0	0
Tobacco manufacturers	0	0	0	0	0	0	0	0	0
Transportation equipment, air, land and water	6	0	0	0	0	6	0	0	0
Miscellaneous industries	0	0	0	0	0	0	0	0	0

present time and it is doubtful if the potential number of industrial power customers exceeds 800,000. The central station must, therefore, turn to the problem of increasing the energy consumption per industrial power customer even as it must do also with its domestic customers. Industrial heating and the use of energy in electrolytic and electro-chemical processes hold the answer to this problem. It is estimated that today the national industrial heating load totals only about 1,200,000 kw., while the potential heating load and related loads is estimated at 75,000,00 kw., or three times the present motor load.

It would appear that the electric light and power industry has come to a milestone in its progress and that the next period of its growth will involve many new problems in generation and distribution.

January 1, 1924 and Energy Consumed by the Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
14	48,695	61.0	133,391	49,705	83,686	45,120	28,416	16,704	2,242	69,712	412	4,930	1,418	3,721
1	500	68.8	2,717	1,737	980	465	465	0	80	900	90	445	82	388
3	300	53.9	4,440	4,150	290	280	232	48	266	3,972	93	872	253	675
0	0	100.0	193	193	0	0	0	0	2	77	5	96	2	7
0	0	100.0	5	5	0	0	0	0	1	1	1	3	2	4
2	1,190	22.0	2,842	222	2,620	1,100	1,030	70	81	2,150	3	75	27	94
0	0	100.0	814	814	0	0	0	0	41	298	95	663	64	136
6	46,300	63.1	119,350	40,000	79,350	42,900	26,330	16,570	1,700	61,075	55	1,720	940	2,280
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	96.5	1,368	1,368	0	0	0	0	14	453	9	46	10	22
2	405	52.5	1,273	827	446	375	359	16	30	381	58	998	25	70
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	87.0	355	355	0	0	0	0	23	386	3	12	11	39
0	0	100.0	9	9	0	0	0	0	1	4	0	0	1	4
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	100.0	2	2	0	0	0	0	1	2	0	0	1	2
0	0	52.0	23	23	0	0	0	0	2	13	0	0	0	0

January 1, 1924 and Energy Consumed by the Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
16	10,264	78.4	118,290	163,422	14,868	9,464	6,998	2,466	3,327	79,874	1,747	30,644	2,744	7,523
1	826	76.8	6,770	5,150	1,620	765	759	6	198	2,240	225	1,110	205	970
10	2,820	56.5	16,510	13,800	2,710	2,615	2,170	445	1,000	14,924	351	3,280	955	2,540
0	0	70.0	1,830	1,830	0	0	0	0	21	728	40	912	12	39
1	39	7.4	82	40	42	36	0	36	2	17	8	49	4	12
0	0	79.6	1,673	1,673	0	0	0	0	48	1,265	2	45	16	56
0	0	100.0	1,875	1,875	0	0	0	0	96	705	228	1,536	153	325
2	5,400	86.5	136,485	127,250	9,235	5,000	3,070	1,930	1,460	52,460	630	19,804	1,120	2,720
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	98.3	2,725	2,725	0	0	0	0	27	903	18	93	20	42
1	1,160	94.6	4,629	3,407	1,222	1,030	985	45	110	1,387	210	3,630	90	254
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	80.3	4,065	4,065	0	0	0	0	258	4,422	28	137	123	430
1	19	29.0	874	835	39	18	14	4	49	370	6	35	22	70
0	0	100.0	2	2	0	0	0	0	1	1	0	0	1	1
0	0	100.0	47	47	0	0	0	0	2	42	1	13	0	0
0	0	82.0	723	723	0	0	0	0	55	410	0	0	23	64

January 1, 1924 and Energy Consumed by the Industrial Plants During 1924

Number of Companies Having Private Electric Generating Plants	Estimated Rating of Prime Movers Used in Private Generating Plants, Hp.	Estimated Electrification of Industry Per Cent	Energy Consumed			Generators in Private Plants			A.C. Motors		D.C. Motors		Motors Under 5 Hp.	
			Total Energy Consumed, Kw.-Hr.	Purchased from Central Stations Kw.-Hr.	Generated in Private Plants, Kw.-Hr.	Total Rating of Generators, Kva.	Rating of A. C. Generators, Kva.	Rating of D. C. Generators, Kw.	Number	Hp.	Number	Hp.	Number	Hp.
			(Thousands)	(Thousands)	(Thousands)									
7	15,224	76.3	31,289	6,244	25,045	14,097	9,197	4,900	558	13,633	345	6,696	374	1,032
0	0	78.5	404	404	0	0	0	0	12	134	13	66	12	57
1	29	74.5	1,685	1,657	28	27	22	5	101	1,508	35	331	96	255
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	100.0	7	7	0	0	0	0	1	2	1	4	2	6
0	0	54.2	569	569	0	0	0	0	16	430	1	15	5	19
0	0	93.0	139	139	0	0	0	0	7	51	16	113	11	23
3	13,500	77.1	23,150	0	23,150	12,500	7,675	4,825	246	8,842	106	3,340	135	328
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	95.5	465	465	0	0	0	0	5	154	3	16	4	9
3	1,695	92.3	3,527	1,660	1,867	1,570	1,500	70	84	1,054	160	2,765	68	193
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	53.5	1,338	1,338	0	0	0	0	85	1,453	9	45	40	141
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	100.0	5	5	0	0	0	0	1	5	1	1	1	1
0	0	.0	0	0	0	0	0	0	0	0	0	0	0	0

Electric Refrigeration Activity Will Mark Merchandising in 1926

ALTHOUGH all fields of electrical merchandise will be cultivated as never before during 1926, activity in the sale of electric refrigeration will advance step by step with that in the sale of ranges and water heaters. This is indicated by the plans announced by sales executives of the power companies of the Pacific Coast, related in this survey article on 1926 merchandising plans.

OUTSTANDING in a year in itself notable for the results achieved is the commanding place which electric refrigeration has earned for itself in the short time since its inception as a domestic appliance. Not less interesting is the important place it is destined to play in the merchandising programs of the central stations for the year 1926. This practically new load-building appliance bids fair to compete successfully with the remarkable development of electric range business, brought to a high point in the past year by intensive merchandising.

In electric-range distribution the year 1925 proved a record-breaker in practically every section of the West. Many companies increased the number of ranges on their lines by 50 per cent, some by 100 per cent, and none by less than 10 per cent. And yet that the field is capable of still greater profitable cultivation is borne out by the fact that as yet no territory served is saturated beyond 25 per cent of the customers served, and only in one instance is so high a saturation reached.

The same general tendencies have been noticed in respect to water heaters, the estimated total number installed in the eleven Western states reaching 39,600. This class of business is being pushed in all quarters where electric ranges are sold, and the present percentage—a water heater sale to each two range sales—no doubt will be bettered under the intensive merchandising programs now under way.

Everywhere a note of optimism characterizes the prospect for the year 1926. A review of the achievements of 1925 and the normal indications of growth of the Western states gives rise to this natural feeling. The record of the year 1925 from a merchandising standpoint is a record of quotas exceeded, sales steadily increasing, and business development in general. There is a quite general feeling that, much of the pioneer engineering of lines having been accomplished, the path has been made smooth and broad for the business builder who follows in the engineer's wake. With lines and services installed, it becomes the major activity of all central stations to build up load upon these lines, to smooth out the low-load valleys with off-peak types of electrical appliances and apparatus, and to keep down rates by maintaining a better load factor.

Crystallization of the central-station merchandising idea, more or less commonly practiced in the East, found a notable instance in the announcement recently made by the Byllesby organization that its companies would inaugurate merchandising programs and open merchandising stores on a serious and complete basis. The first of such stores to be opened will be that in connection with the Western States Gas & Electric Company's offices at Stockton, Calif.

Speaking of the merchandising policy to be followed in that instance, H. K. Griffin, commercial agent for the company, says:

"No quota has been set for electric-range sales for 1926, due to the plans for a complete appliance sales department and the consequent inclusion of range sales in this department. For the same reason nothing definite has been decided in the field of electric refrigeration. As just noted, an appliance sales department is planned for 1926. This department will be operated as a function of the new business department. A complete line of electric appliances will be handled, and every effort will be made to conduct the department along the highest type of merchandising. Further details as to the method of merchandising, kinds of appliances sold, etc., are not as yet decided. It is, however, settled that appliances will be sold on time payments, and that every facility will be offered to customers for obtaining electric appliances on terms which they can handle.

"The first store will be opened in conjunction with the general offices of the company in Stockton in the early part of 1926. It is planned that eventually the appliance sales activity will extend to all of the properties of the company, this growth being dependent upon several factors. It is quite probable, however, that sales activity will be confined to the Stockton store for several months at least.

"This company is firmly convinced of the correctness of the policy of central-station merchandising, provided it is done on the proper basis. There can be no argument as to the desirability of placing appliances and lighting load on the line of any company, for it produces additional revenue with very little, if any, capital expenditure. The

placing of this additional load is strictly a central-station job, for we cannot expect any other agency to have the same interest in it as we should have, as they do not have the same incentives."

In reviewing the merchandising done by his company during the past year, Mr. Griffin went on to state that during the year the company had sold ranges and water heaters to its customers at a price considerably lower than the manufacturers' retail list. No special campaigns were employed, the work being done entirely by the various district managers and field men in conjunction with their regular new business solicitation. Working in that manner, 52 ranges were sold during the year with approximately helf that number of water heaters, ranging from 3 to 5 kw. each. No electric refrigerators were sold by the Western States Gas & Electric Company, according to Mr. Griffin, the company not having entered that field. Several machines which had been placed on the market were sold by independent agencies, Mr. Griffin said, and their performance was being watched carefully by the company to determine the character of the load and its operating characteristics.

Coast Valleys Gas & Electric Also to Merchandise Appliances

Announcing that it, too, as another Byllesby company, soon would inaugurate a merchandising policy on a large scale, the Coast Valleys Gas & Electric Company, Salinas, Calif., reported a year of excellent results in the sale of such appliances as it has handled during 1925. P. L. George, manager of the commercial department, reported that the company had sold during 1925 a total of 158 ranges, and as a consequence has set a quota of 180 ranges for its 1926 sales.

Entering the field of electric refrigeration sales early, the Coast Valleys Gas & Electric Company reports having sold 10 of the domestic machines and has set for its 1926 quota 25 more refrigerators. In selling ranges that company employs a range salesman, uses newspaper advertising, and has found free cooking schools effective sales promoters. It has held two demonstrations in small towns in the past year and plans to use the same methods in 1926.

Speaking of its special campaigns during 1925, Mr. George tells of a special lamp sales campaign which was handled through a local dealer in which the company co-operated. This sale resulted in the sale of approximately 80 kw. in lamps, filling many empty sockets in the territory served. A kitchen lighting unit campaign handled by the company was started on Nov. 16 and is still in progress.

"It has been announced," concludes Mr. George, "that this company will handle the merchandising of electric appliances as soon as we are established in our new quarters, which will be some time during the middle part of the year. The definite plans are not known at this time."

No change in merchandising policy, however, is contemplated by the San Diego Consolidated Gas & Electric Company, also a Byllesby property, at least for the immediate future, according to the report of A. E. Holloway, superintendent of the commercial department of that company, in announcing the new year's plans.

San Diego Company Reports Good Range Sales During Year

"As you know," says Mr. Holloway, "we are not actively in the merchandising business in San Diego, leaving this mostly to the electrical dealers. However, during 1925 we carried on two or three very successful campaigns. The first campaign was the placing of 3,600 kitchen lighting units in various San Diego homes. This campaign was carried on by the company by placing salesmen directly in the field and making a house-to-house canvass. Contracts for the installation of these units were given to the electrical dealers.

"Also in co-operation with the electrical dealers the company carried on a sales campaign on electric irons. This was done completely through the medium of advertising and display, and there was no house-to-house solicitation. The campaign was carried on for a period of two weeks, and approximately 300 irons were sold.

"The company during the last year sold 437 electric ranges and electric water heaters, which we consider fairly good, due to the fact that we do not attempt to sell ranges in the territory we supply with gas. The quota for 1926 is 600.

"The company does not sell electric refrigerators, but the following refrigerators were handled in San Diego during 1925 by dealers: Servel, Frigidaire, and Kelvinator. There were approximately 350 of these machines sold by these dealers.

"The method employed in selling electric ranges is a direct house-to-house canvass, together with broadsides and newspaper advertising. The company handles two makes of electric ranges, and dealers who desire to operate with the company may do so upon a basis of a 15-per-cent commission from the company retail price where the dealer handles the account, and a commission of 10 per cent from the retail price where the company handles the account. Ranges are sold over a one-year period with the addition of 5 per cent for carrying charges.

"During 1925 the new-business growth of the company has been very satisfactory, and we have had considerable power load, and the additional load in street-lighting has been especially good. By proper presentation 586 ornamental street lighting posts were added during 1925 and 204 overhead street lighting units. The ornamental street-lighting has been greatly popularized during the last year, and we have in process of installation over 800 units which will come on in 1926. We have two special campaigns planned for 1926, one an industrial and commercial lighting campaign and the other a Red Seal campaign.

"General business conditions look exceedingly fine in this district, as a great deal of interest is being shown in better street-lighting, better store-lighting, and in the greater use of electricity in general. We believe that the domestic electric refrigerator,

having been practically introduced in this district during the last year, will receive a great volume of sales during the coming year. New construction and building work is very active, and we expect it to carry on during 1926."

Southern California Edison to Double its Sales Force

The Southern California Edison Company, with the record of a remarkable year of commercial development in 1925, plans to redouble its sales efforts and to double its sales force in 1926, according to brief announcement by W. L. Frost, general commercial manager of the company. Although not yet ready to publish plans for the year's activity, Mr. Frost stated that all efforts of 1925 would be doubled.

The Edison company is known to have had results in its kitchen lighting unit sales campaign considered excellent by all who are familiar with the situation. In its range and water heater sales, too, records of past years were known to be exceeded. A recent announcement by S. M. Kennedy, vice-president in charge of business development and public relations, would indicate that the company intends to enter the field of merchandising of electric refrigerators during 1926. It is known also that the Edison company has been getting good results from the sale of one special appliance each month, a campaign in which the Electragists of southern California have shared.

Southern Sierras Company to Sell Electric Rrefrigerators

Indicating that the Southern Sierras Power Company intends to merchandise electric refrigerators in 1926, although it has not previously done so, George T. Bigelow, assistant general agent, says:

"We have not sold electric refrigerators during 1925, but intend to take them on during 1926. I have not made up a quota on this as I do not know just how many men I will have working on this proposition. We will probably get started on this in February.

"Final check of our figures is not in for the year, but the number of ranges sold during the year is approximately 215. It will not vary more than one or two either way. Our quota for 1926 is not given out until February, but it will be in the neighborhood of 325.

"The only method we employ in merchandising ranges and the one we will employ in merchandising refrigerators is to put on salesmen who receive salary but no commission and who work steadily on the job without special campaigns. It is my belief that in this way we get the most kilowatt-hours for our money and kilowatt-hours that stay on the lines, and also develop the men so that they become useful utility men rather than transient high-pressure salesmen. We have not done any spectacular work during 1925 and do not expect to put on any special campaigns in 1926. I have found this type of work adapted to our small, scattered community.

"1925 has been, from a commercial standpoint, the best year we have had in every particular. The power load has increased to a most gratifying extent, and the heating and lighting load is building up in a most satisfactory way.

"We have maintained our range saturation of ten to one, possibly lowering it a little bit when actual figures are in, and have been able to increase our water-heater sales over fifty per cent.

"I see no reason why 1926 should not be equally as good, and we feel rather confident of making it a better year."

San Joaquin Power Has Remarkable Record

One of the most consistent and thorough programs of commercial development was reported by the San Joaquin Light & Power Corporation, of Fresno, which merchandises through its subsidiary, the Valley Electrical Supply Company. For all 'round commercial development the report of the past year's activities and the program for 1926 of the latter show the company to be a distinct leader in merchandising and load-building from an industrial and agricultural standpoint. A. M. Frost, manager of sales, reporting for the San Joaquin and Midland Counties systems shows that for the year 1925 the load increase signed up was:

5,463 kw. in lighting.
11,090 kw. in heating and cooking equipment.
14,791 hp. in industrial and oil-field motors.
29,526 hp. in agricultural motors.

"During the year 1926," says Mr. Frost, "we are making a special sales effort in industrial and commercial lighting and industrial power and heating. To cover this activity, three men have been added to the general sales organization to cover the system. During the year these salesmen will visit every industry we are serving, for the purpose of determining whether or not our service at the present time is satisfactory and used in the most efficient and economical manner, and to sell additional service where such sales can be proved to be of benefit to the customer. These three men are in addition to the present general sales organization and will work in the districts, aiding the district salesmen in every way possible.

"Twenty-eight members of the sales organization will, this year, take the lighting and power sales courses of the National Electric Light Association. The organization of this educational work will be handled through this office under the direction of H. N. Carroll."

Supplementing Mr. Frost's remarks, and dealing particularly with the merchandising of appliances, H. H. Courtright, president and manager of the Valley Electrical Supply Company, the merchandising subsidiary of the San Joaquin Light & Power Corporation, relates the achievements of that organization in 1925 and its plans for 1926.

Campaign on One Appliance Each Month

"During the year 1925 we have campaigned one electrical appliance each month, and, as this program has proved very successful, this policy will be continued through the year 1926, only on a larger scale.

"As to any commercial achievements, we believe

our plan of featuring a special appliance once a month and our fireless-cooker sale were our outstanding achievements in our merchandising sales. A report of our fireless-cooker sales has previously been published in your Journal. (See Journal of Electricity, Sept. 1, 1925, p. 183.)

"During the year 1926 you will note that the quota is considerably above the actual sales of 1925. The figures are high but we feel we will reach them before the year is over."

The report of the electrical merchandise sales for the year 1925, and the quota for 1926, is as follows:

APPLIANCES	Sold During 1925	Quota for 1926
Ranges	739	1,000
Water Heaters	605	800
Heavy Duty Appliances	237	300
Ice Machines	34	50
Large Air Heaters	209	500
Cookers	4,185	6,000
Heaters	997	3,000
Irons	1,182	1,400
Percolators	1,423	2,500
Toasters	1,712	2,500
Table Stoves	411	500
Fans	876	1,200
Waffle Irons	569	1,500
Vacuum Cleaners	354	400
Heating Pads	221	500
Boudoir Lamps	480	1,000
Curling Irons	342	600
Soldering Irons	180	300
Small Motors	217	400
Lighting Fixtures:		
Residence Lighting Fixtures	2,697	3,500
Store Lighting Units	1,561	2,000
Window Lighting Reflectors	401	600
Spotlights—Window	27	50
Kitchen Lighting Units	5,370	7,000

Complete text of the sales policy of the Valley Electrical Supply Company as regards ranges, water heaters, and heavy-duty appliances, may be of interest.

The Valley Electrical Supply Company salesmen will assist the dealer in making sales on ranges, water-heaters and heavy-duty appliances, or will make the sales and place them through the dealer.

All sales are to be placed with the dealer or dealers within the immediate territory in which the equipment is sold.

This service is given to the dealers or merchants who will co-operate with the San Joaquin Light & Power Corporation and the Valley Electrical Supply Company in putting over this range, water-heater and heavy-duty appliance campaign.

When sales are made by the Valley Electrical Supply Company salesmen, the salesmen must inform the purchaser of the nearest dealer or merchant that is co-operating with us in this campaign, the purchaser to select the dealer or merchant with whom he wishes to place his order.

Should the purchaser wish the Valley Electrical Supply Company salesman to place the order with some responsible dealer or merchant, then it is the duty of the salesman to use his best judgment in placing the order. Should there be two or more dealers in the immediate vicinity, the order should be placed with the firm that is most entitled to the sale. Should one firm be securing the majority of the sales and be co-operating enthusiastically with us in our campaign and the other firm be giving our campaign very little help and making few sales, then in that case the first-mentioned firm is entitled to the sales.

The placing of these orders should be given very careful thought for our co-operation dealers and merchants are entitled to fair play and must have it. This point spells success or failure of our "through the dealer sales plan."

Consigned Range

The Valley Electrical Supply Company will consign one Hotpoint or Westinghouse domestic electric range with any dealer or merchant who will co-operate with them in making this campaign a success, it being strictly understood that the consigned range be given prominent display space on the sales floor in his store, and further that the range is the property of the Valley Electrical Supply Company, and must be displayed at all times. At no time can it be sold to a consumer. A consigned contract, specifying the range desired, must be signed by the dealer or mechant before the range is shipped to them.

Terms

Should the dealer wish to sell this equipment on terms of so much down and so much a month and not wish to carry the terms paper, then it is the duty of the Valley Electrical Supply Company salesman to advise him to consult his banker or some finance corporation before making sales of this kind.

Pacific Gas and Electric Adds Greatly to its Connected Load

Following up the 1925 increase of business in its many lines of activity, the Pacific Gas and Electric Company will carry on the good work in 1926 in many fields of endeavor, according to R. E. Fisher, vice-president in charge of public relations and sales. Although not to sell electric refrigerators itself, confining its merchandising operations to ranges, air heaters, water heaters and lighting, that company intends to co-operate with the dealers toward the better distribution of the refrigeration appliances. Says Mr. Fisher of the past year's activities:

"The number of electric ranges sold by the company during 1925 was 3,031, with a resultant total conected load of 21,380 kw. In 1926 our quota is set at 5,000 ranges, and we hope to put on a connected load of 34,000 kw.

"The water heaters sold in 1925 were 1,262, with a total connected load of 6,009 kw. For 1926 our quota is set at 2,500, with a resultant connected load of 11,750 kw.

"Air heaters sold in 1925 amounted to 3,293, with a total connected load of 10,939 kw. For 1926 our quota is set at 7,000, with a resultant connected load of 23,000 kw.

"The number of electric refrigerators sold on the lines of our company in 1925, as close as can be determined, is 875, and the quota set for 1926 is 2,000. The 2,000-quota includes both domestic and commercial refrigeration units and machines and will result in a connected load of 500 kw.

"In view of the splendid dealer co-operation which is enjoyed at the present time, through dealers handling refrigerators and units, both domestic and commercial, we are positive that they can promote this business to better advantage by receiving our co-operation, through dealer encouragement, servicing, advertising, and special contact through our sales personnel.

"The methods which we will employ in merchandising electric ranges throughout 1926 will conform very closely to the plan of 1925. Very slight changes will be made to this plan. The principles will not be changed in any form, except that in certain cities the flat installation price will be raised. These cities have not, as yet, been designated, but will be as soon as the completed report of the installation costs is received."

No actual merchandising of refrigerators or units will be employed, Mr. Fisher goes on to state, and continues:

"The most spectacular commercial achievement along the merchandising sales lines in 1925 was the progress made in kitchen lighting unit sales, having set a quota of 20,000 kitchen lighting units for the six-month period—July to December, inclusive—and the accomplishments showing that 31,970 were disposed of.

"In addition to that we feel that the accomplishments made on industrial heating sales for the year were very much to be proud of; 2,404 kw. of industrial heating equipment was added as against 538 kw. in 1924.

"The only special campaign plan for 1926 will be one to handle the sale of portable table lamps, of which we propose to dispose of 4,500, which will add 450 kw. to our lines. This campaign will start in February, continue in Mach and April and be held again in October, November and December.

"Kitchen lighting unit sales activity will continue during January, February and March and then will be postponed until Sept. 1, after which it will continue to the end of the year.

"During the months of May, June, July and August a special house-to-house activity on refrigeration machines and units will be in effect. Prospects that are received will be turned over to the local refrigeration dealers for closing.

"The electric sales accomplishments during 1925 have been highly satisfactory. This was made possible through the splendid co-operation received from all branches of the industry, and we are optimistic and look forward to much greater activity in sales during 1926."

Coast Counties Employees Make Record in Kitchen Light Unit Sale

Remarkable results were obtained by the Coast Counties Gas & Electric Company in its kitchen lighting unit campaign, as well as in its range sales during 1925. Serving a territory of 13,000 customers, a quota of 1,000 kitchen lighting units was established, and the fourth day after the campaign started the company had placed 1,287 units in operation. Believing in taking its own medicine, the entire personnel of the company itself first was sold kitchen lighting units, and once completely "sold" themselves, the employees were released to sell units to the community. The results were nothing short of amazing in some instances, it being reported that one gas service man in Gilroy sold 80 units. Another gas man, on his day off, sold 16 units. An electric trouble man in Santa Cruz sold 70 units, and a bill collector sold 60 units. Even the wives of employees were in the field selling the units. And soon the quota for units was raised from 1,000 to 3,000.

Of its range sales activities, M. F. Wales, general agent of the Coast Counties Gas & Electric Company, says:

"During 1925 we sold 121 electric ranges and 55 water heaters. We did not carry a line of electric refrigerators and consequently sold none. The method employed in merchandising the ranges was as follows: The company purchased ranges in carload lots and sold them through the medium of employees and one regular salesman.

"Our salesmen and employees assisted the dealers in making any sale in which the dealer requested help, and ranges were sold to dealers at our wholesale cost. We have fixed a quota of 175 ranges for 1926."

Truckee River Power Company to Sell Refrigerators

Although not having engaged in merchandising activities until now, the Truckee River Power Company will engage in the sale of electric refrigeration in 1926, according to O. S. Clifford, commercial agent. "We do not merchandise either electric ranges or refrigerators," says Mr. Cilfford, "however, we plan to handle refrigerators during 1926."

California Oregon Power Company Not Ready to Announce Plans

With the year's reports not to be completed until about the end of January, the California Oregon Power Company, according to W. M. Shepherd, vice-president and general agent, will not be able to report on the year's activities which, however, are known unofficially to have been consistently in keeping with the company's engineering growth during the period. Plans for the new year, too, were not in sufficiently definite form to allow of announcement.

Portland Electric Power Company Exceeds Range-Sales Quotas

Also intending to enter the field of electric refrigeration sales, but with the idea in mind of protecting the ice manufacturer inasmuch as possible, as well as pushing range sales in customary fashion, the Portland Electric Power Company looks forward to a favorable year in 1926. A. C. McMicken, sales manager, in reviewing the year's activities, comments as follows:

"Our merchandise sales for the year 1925 have been very satisfactory, our principal effort being put behind the sale of electric ranges. A quota of 2,000 range sales was reached, and it is our plan to sell at least 2,500 in 1926. Spring and fall campaigns of from thirty to forty-five days each will be conducted, and in addition we will adhere to our usual policy of pushing range sales every day in the year.

"Early in 1926 we will actively begin the sale of domestic electric refrigerating plants, and intend so to conduct our sales efforts as to promote the sale of all such equipment handled by the dealers in the territory we serve. We also hope to assist the manufacturers of ice in a greater sale of their product through advertising that will point out to our customers and the public the desirability and necessity of refrigeration for the proper preservation of foods.

"The present outlook for the sale of electric current-consuming devices in our territory for the year 1926 is excellent, and we believe that sales of all electric merchandise will exceed previous years."

Pacific Power and Light a Pioneer in Refrigeration Sales

Co-operation with the manufacturer of the electric refrigerator which it has been selling, in the way of advertising and sales promotion, is expected by the Pacific Power and Light Company, a pioneer in the sale of electric refrigeration. According to V. H. Moon, appliance sales superintendent:

"It is our belief that the coming year will bring us more domestic electric refrigerator sales than in the past. The manufacturer whose product we are selling will advertise directly in our districts and we will tie up with this advertising by a special campaign in the spring of the year. In addition to the spring campaign we intend to put considerable effort on refrigeration throughout the year. Last fall we placed about twenty-five machines among our customers for trial throughout the winter months, and undoubtedly this same procedure will be used again next fall. We confidently expect to place in the neighborhood of 150 refrigerating plants during the year.

"We expect to carry on a campaign on electric ranges during the months of May, June and July, 1926. These months have been used successfully in the last two years, and we believe that this year we will be able to place more ranges with our customers than in either of the two years past. The range campaign will be conducted with the aid of newspaper advertising, cooking schools and a competitive prize plan between company districts, and again we will concentrate vigorously only in those districts in which we do not sell gas. We contemplate a sale of 300 ranges during this period."

Northwestern Electric Company Will Conduct Four Campaigns

Expecting to exceed its range sales of 1925 by at least 500 ranges, the Northwestern Electric Company has set itself the goal of 2,000 ranges for 1926, according to J. C. Plankinton, sales manager, who says:

"During 1926 we will again vigorously push the sale of electric ranges in the expectation of reaching a quota of 2,000 installations. This quota is 500 greater than that set for 1925, but our success in placing 1,500 ranges last year, coupled with a consideration of the apparent prosperous outlook for 1926, leads us to this optimism regarding the possibilities. We will conduct the usual four campaigns, a spring and fall campaign of six weeks duration each, and a summer and winter one of four weeks each.

"Beginning in March and extending through April and May, special effort in the nature of a campaign will be put upon the sale of domestic electric refrigerators. The backs of customers' bills will be utilized for printing our advertisements of refrigerators, and considerable newspaper space during this period will be devoted to refrigeration. By way of making a start in this activity last year, we installed late in the fall several machines to remain on trial through the winter and until the first of March. We have every reason to believe that the great majority of these trial installations will be converted into sales, and if this policy proves successful, it will probably be utilized again next winter when normally the refrigerator business is quiet."

Mountain States Company Will Sell Ranges and Refrigerators

Although its plans for the year were not considered complete enough for announcement, the Mountain States Power Company intends to sell both refrigerators and ranges during 1926. F. L. Brewer, sales manager, states:

"At the present writing our plans for merchandising electric ranges and domestic electric refrigerators are not complete. We have not yet selected the type of refrigerator we are going to handle, and our range program is still somewhat unsettled. We do, however, plan to push the sale of both appliances in our territory."

Tacoma Will Make Entire Year a Range Campaign

With Cushman power to be available early this year, the Department of Light and Water, City of Tacoma, will conduct its range sales upon a year-long campaign. Says Llewellyn Evans, superintendent of electric works:

"We have definitely decided not to run our range business on a campaign basis next year, but rather we would say that the whole year will be one big campaign, because we are going to bring in our Cushman power. We will not concentrate on the range of one manufacturer at any one time, but we will take all the lines that we have been selling and stress them all continuously, using our mailing list and newspaper advertising. With the sale of 527 ranges during 1925 we have just closed the most successful year in the history of our range department. The coming year promises to produce even greater results."

Seattle Sets $600,000 Sales Quota and Will Open Branch Stores

Newspaper advertising and intensive sales effort is to be given ranges, water heaters, air heaters and refrigerators, according to J. D. Ross, superintendent of the light department, city of Seattle, who annunciates his sales policy as follows:

"We expect to push the sale of electrical appliances, especially the heavy-duty lines such as ranges, heaters, restaurant equipment, etc., during 1926, and will use a liberal amount of newspaper advertising to assist us in exceeding our sales quota of $600,000, which we have set for the year. We also expect to open branch stores in different districts of the city and to conduct demonstrations of electric cooking in these stores."

Puget Sound Power & Light Company Will Carry on Customary Campaigns

"We have not at this time definitely set up our plans for merchandising electric ranges and refrigerators for 1926," says R. W. Lindley, merchandise sales manager for the Puget Sound Power & Light Company. He continues: "We are preparing, however, for our customary range campaigns, and also

for pushing the sale of domestic electric refrigerators."

Vancouver, B. C. Electric Railway to Hold Cooking Schools

Considering the price of electric refrigerators in Canada as too high for widespread distribution at the present, E. E. Walker, sales engineer for the British Columbia Electric Railway Company, Vancouver, B. C., says that major effort in 1926 sales programs will be on ranges, but that refrigerators also will be handled. His statement follows:

"Although we have not yet definite plans for merchandising electric ranges and domestic refrigerators for 1926, we do expect to sell these appliances, and at the time of writing are working out the details of our program. Tentatively, we are aiming at a quota of 500 ranges for the year in the Vancouver district, concentrating principally on a two-months campaign during May and June. We will feature small down payments with subsequent payments extending over sixteen or eighteen months, and are attempting to arrange for a five-day cooking school sponsored by one of the local newspapers some time during the month of April. This plan is subject to possible revision.

"We consider the price of electric refrigerators too high for us to expect a great volume in refrigerator sales. We handle a machine that is high-grade and satisfactory in every way, but do not expect to make many sales this year on account of the hight price."

Victoria Division, B. C. Electric Contemplates Prosperous Year

"While 1925 was a year full of steady progress for the Victoria branch of our company," declared S. J. Halls, manager light and power department of the Victoria, B. C., division of the British Columbia Electric Railway Company, in describing the prospects for commercial development in that territory, "we contemplate a still more active year in 1926 in the lighting, power and appliance business. Campaigns on electric ranges, as well as other appliances, are planned for the spring months of 1926. While the company co-operates fully with all electrical dealers in their merchandising efforts, it operates two retail stores in Victoria, and carries a full line of domestic appliances for the home. Through its home service department the company is in a position to render its customers an efficient personal service.

"With a bountiful wheat crop and business generally on the up grade, we cannot help but feel optimistic as to the prospects for us in Canada during the current year. Benefiting from improved local conditions, and from the splendid support extended by manfacturers in educational campaigns and national advertising, the electrical industry here as a whole should enjoy in 1926 the best year of its existence."

With two range campaigns scheduled and a plan for the intensive merchandising of refrigerators, The Washington Water Power Company looks forward to a year of strenuous merchandising activity. R. B. McElroy, assistant sales manager of the company, reviews the prospect concisely.

Two Campaigns Scheduled by Washington Water Power Company

"We plan to continue our intensive selling program on electric ranges during 1926 by having two campaigns as in the past. The first one will start about April 1 and continue for six or seven weeks; the second will run from the middle of July to the first of August. The incentive for customers to buy during these campaigns will be the exceptionally easy terms offered, a method found so successful in the past, combined with the offering of a suitable premium with each range purchased. During the other months of the year we will continue to exert our usual effort toward the selling of ranges. Mr. McElroy continues:

"In the sale of domestic electric refrigerating plants we hope to double the results of 1925, which will mean the sale of approximately 300 plants. It is not our intention to conduct any short-term intensive campaign on these plants, but simply to push the sale of them continuously month by month, offering them at a small down payment followed by low monthly payments as heretofore. We cannot help but feel that the 150 satisfied purchasers of 1925 will, by their boosting, prove to be a stimulating influence to our 1926 efforts, and that we will reach the quota set.

"The year 1925 has been an exceptionally good one for us. Our total range sales have broken all previous records, and in view of the favorable outlook for general conditions in 1926, we feel safe in forecasting for the current year results even better than those of the year just ended."

Idaho Power Company Sets Itself High "Bogie" for Sales

J. F. Orr, sales manager for the Idaho Power Company,maintains that his company expects to sell 1,500 ranges and 250 refrigerators in its many stores throughout its territory in 1926. His statement is:

"Our 1926 sales program calls for concentrated effort in the sale of both electric ranges and refrigerators. We have set up a 'bogie' of 1,500 ranges and 250 refrigerators, to be sold during the year. These quotas have been divided among the various stores scattered over the territory we serve and a definite 'bogie' given to each. Last year we sold approximately 1,000 ranges, and in view of the prospects for the current year we feel justified in setting a higher mark at which to aim."

Utah Power & Light Company Will Repeat Spectacular Washer Sale

A record of 1,265 washers sold in its March campaign on washers last year will call for similar activity this year, together with intensive sales of ranges and refrigerators, it is stated by P. M. Parry, commercial manager, Utah Power & Light Company. Reporting excellent results in its range and refrigerator sales in 1925, that company will employ much the same sales methods for the distribution of major appliances in 1926.

"There were 1,046 electric ranges sold during the year 1925," Mr. Parry reports, and goes on to say, "We will probably set our quota for 1926 at 1,200, and hope that sales will run somewhere near 1,500 ranges for this year.

"Refrigerator sales for 1925 will run between 85 and 90. This small number of sales, of course, is due to the lateness of the season when we actually started, and the initial effort to promote refrigeration. We will probably set as our goal for 1926 700 refrigerators.

"We expect to continue to use the same scheme in 1926 on ranges and refrigerators as formerly established, namely, the intensive solicitation for both classes of business by outside salesmen, backed by a rather liberal amount of advertising, as well as a tie-in with the floor display and inside selling. It is our intention to have our outside salesmen devote themselves almost entirely to the sale of ranges and refrigerators during 1926.

"Probably the outstanding merchandising activity during 1925 was, so far as gross volume of business was concerned, our automatic washer campaign in March when 1,265 machines were sold. We expect to conduct such a campaign again during 1926, and this campaign, together with the activity on ranges and refrigerators mentioned above, will be our special campaign plans for 1926. It is our intention, however, to attempt to work in other campaigns on smaller devices, such as floor lamps, irons, percolators, etc.

"At this time it looks as though our gross sales for 1925 will just about equal the sales of 1924, although it should be borne in mind that the year 1924 was one of the very best years we have ever had in the sale of electrical merchandise. Nineteen twenty-six promises to be very good, although it looks at the present time as though we will have to expect the improvement shown for 1926 to appear in range and refrigerator sales."

Great Western to Extend Home Service

"Our program for 1926 includes the addition of new men and improving the personnel in our 'Home Service Department' which is anticipated will promote improved conditions during the coming year," says F. H. Woodward, general sales manager for the Great Western Power Company of California. Of the past year he goes on to state: "Our total new contracted load was 45,997 kw., which represented 8,631 new consumers. Our total connected load is now 514,971 hp., and our consumers number 57,060.

"During 1925 we contracted for 1,014 electric ranges, 315 domestic water heaters, and 605 domestic air heaters, totaling 9,100 kw., in addition to 1,500 kw. of commercial heavy-duty cooking and heating equipment.

"We have reason to believe that 1926 holds out splendid inducements for new business as well as a big improvement over previous years in the electric range, air and water-heating field, our quota being 1,500 ranges for 1926.

"We have made no decision to handle electric refrigerators and hope they can best be marketed by distributors. We are, however, offering our co-operation and support to manufacturers placing this very necessary equipment before our consumers. We have no record of the number of refrigerators installed on our lines in 1925 but anticipate that 1926 will show an advanced improvement.

"Our method for merchandising electric ranges will be similar in 1926 to those during the last five years by direct sales contact and co-operation with the dealer, specializing with the home owner and the housewife supervising her own kitchen. We have found this to be the best field.

"The localities which are served by this company are being rapidly developed. The demand for power for industrial and commercial purposes, electrical advertising, illumination and domestic service is becoming greater year by year. We hold that 1926 will show a marked gain in the consumption of electric energy on our system."

Colorado Companies Plan to Outdo 1925

Although definite work as to the programs for the year 1926 was not received from the Colorado power companies, it is known from previous statements that a like development of merchandising in that territory was experienced. In the case of the Public Service Company of Colorado, especially, was merchandising carried on in a manner which is to be equalled by few if any other Western company. With a large store devoted to the sale of electric appliances of every kind, that company is known to have developed its load-building to a high degree. In commercial lighting, Denver is rated as one of the first cities of the country.

Altogether the year 1925 may be said to have been one of exceptional commercial enterprise in the electrical industry. And the central stations of the Western states, in extending their activities in the commercial development of their respective utilities, have been fulfilling the destiny expected of them. The West has given the world some of its greatest electrical engineering achievements. To be consistent with these works, and to build a normal and well rounded future, it has been given to the commercial departments of the Western utilities to back up the engineering works with load-building commercial enterprise, which will not only make necessary the further initiative development of engineering to meet future needs, but also will give a solid foundation of commercial demand for the works that have already been accomplished.

That 1926 will find the central stations still more thoroughly cultivating the fields of their commercial possibilities is evidenced in the foregoing statements made by the leaders in this commercial work for these many utilities. That the end of 1926 will find the business of generating electricity to be approaching nearer the goal of more complete service electrically to the public, there can be little doubt. This is one industry which, in the extension of its facilities to those it serves, creates a better and more worth-while life. And it has been visioned as the province of the commercial men of the industry to bring this ideal nearer to realization.

IDEAS FOR THE CONTRACTOR

Electrical Estimating for the Contractor — VII

Layout of Motor-Generator Sets for Charging Storage Batteries Protecting Against Current Reversal

By J. R. WILSON*, Engineering Department, Los Angeles Electric Works

Each estimator undoubtedly has some particular class of job which he prefers to figure. To the electrical estimator who is really interested in his work, those jobs which present something a little bit different from the ordinary run of estimating problems are the ones from which he derives the most pleasure.

To solve some problem which at first glance seems to be impossible, or to devise some new application of electricity, are the things that make electrical estimating worth while. In this article of the series the job to be discussed presented one of those problems.

No claim is made for perfection of the manner in which the problem finally was solved, but it does represent the result of considerable thought being given to the problem. Some readers may have different ideas on this problem, and their solutions will be received gratefully by the writer, care Journal of Electricity, and will be published.

As most electrical men know, the most serious problem met with in the charging of storage batteries on a commercial scale is in guarding against current reversal. In using motor-generator sets for charging batteries some means always is provided to prevent the generator being driven as a motor should the alternating current supply fail for any reason.

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In the installation under discussion the specifications read as follows:

1. Provide and install two motor-generator sets, one of 25-kw. capacity and one of 15-kw. capacity, both 125-volt d.c.

2. Provide and install full automatic and manual control equipment to meet the following conditions:

3. A.c. service shall be 440-volt, 3-phase, 60-cycle and shall enter at the first floor level. Place service switch and meter in basement at location of a.c. switchboard.

4. Motor-generator sets and a.c. distributing and control panels shall be located in basement where directed. Also d.c. fused main switches.

5. Direct current main switchboard and feeder switches shall be located on third floor in battery charging room.

6. It is the intention of the owners to operate either machine separately or both together, feeding into one common d.c. bus. The characteristics and speeds of each machine shall be such that the above mode of operation will be possible. All necessary protective devices shall be furnished and installed to make machines non-interfering.

7. Machines shall be so wired and equipped that it will be possible to start or stop either or both machines from either the basement or third floor. Also that they may be stopped at basement and re-started at third floor or vice versa.

8. Should a.c. supply fail and machines stop, devices shall be provided to prevent battery load feeding back and running generators as motors. Upon resumption of a.c. current supply, generators shall return automatically to operation, but d.c. current shall not be fed into d.c. bus until generator shall have reached full operating voltage.

Possibly some of our readers will consider the above layout very simple, but to others it will present an interesting problem.

The wiring diagram shown in Fig. 1 is the one finally adopted as being correct. The installation has not been completed at the present writing, but the layout has been checked by engineers of the General Electric Company and approved for operation. The wiring layout also has been approved by the local electrical inspection department.

The equipment data on this installation is as follows:

Machine No. 1 — 25-kw., 125-volt, 1,150 r.p.m. Westinghouse Type S, direct-current generator, direct-connected through flexible coupling to 40-hp. G. E. 440-volt, 1,150 r.p.m. 3-phase motor.

Machine No. 2—15-kw. generator of same make, type and speed, to Westinghouse type C.C.L. 30-hp., 1,150 r.p.m. 440-volt, 3-phase motor.

Compensators—General Electric automatic, type C.R., 7051-J 1.

Control Buttons — General Electric C. R. 2940-B.S.12M. (Start and stop —interlocking.)

Protective Relays—General Electric type P.Q. definite time delay—circuit closing. (Max. delay 30 seconds.)

D.C. Contactors — General Electric type C.R. 7002 2-pole, 300-amp. (Cat. No. 1771681 G3.)

D.C. Main Switches — 2-pole, 400-amp. fused—externally operated.

The rheostats and meters were of standard make and proper capacities.

Should any unforeseen developments arise when this plant is placed in operation, they will be noted in a later article in this series. Any comments or suggestions on this layout or any other appearing in the series, will be welcomed by the writer.

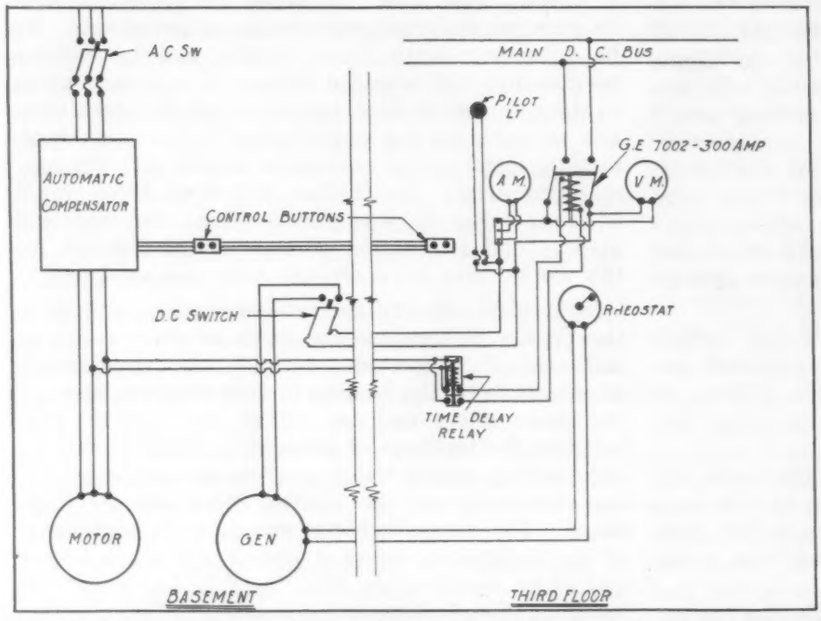


Fig. 1. Wiring diagram for each motor-generator set installed for charging storage batteries. By this method the system is protected against current reversal should the alternating current supply fail.

Prominent San Francisco Man Builds an All-Electric Home.—A home completely equipped electrically recently was built on Corinthian Island for E. H. Pauson of San Francisco. The electric equipment includes a Howard electric range, a Wesix water heater, and Majestic air heaters. The installation was made by Perry & Johnson, electragists of Sausalito.

What Price-Cutting Costs

From the Los Angeles office of the Standard Sanitary Manufacturing Company comes a concise statement of the effect of price-cutting on profits.

"The following compares the percentage of price-cut with the additional volume of business necessary to hold up profits to a certain definite level:

"On 25 per cent margin of profit a cut of 5 per cent requires 18⅔ per cent more volume.

"Eight per cent cut requires 35⅛ per cent more volume.

"Ten per cent cut requires 50 per cent more volume.

"Twelve and a half per cent cut requires 75 per cent more volume.

"Fifteen per cent cut requires 112½ per cent more volume.

"In other words, if you cut the price 15 per cent on a $100 sale, it is necessary to sell $112.50 worth of additional business before there can be a $25 profit provided for in the original sale."

Modern Building Completed by Los Angeles Electragist

Probably one of the finest electrical establishments in the West has been completed by H. H. Walker, electragist of Los Angeles. The building is of Spanish architecture. It contains three stories and basement and is approximately 50 x 90 ft. In addition to the building a large service yard with sheds at each side for trucks is provided.

The first floor is given over to the merchandise store and warehouse space for handling heavier material. In the merchandising room the Spanish idea has been carried out throughout. The fixtures were built to order after old Spanish designs and the floor is red Spanish tile.

This building is the new establishment of H. H. Walker of Los Angeles. The prominent position of the word "electragist" is significant.

In the retail business of the firm Mr. Walker is looking to the future, and novel and attractive salesrooms have been fitted up to make easy the selling of electrical appliances.

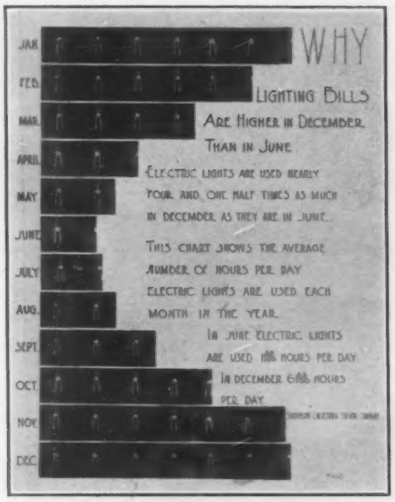
The second floor is used for general and private offices. Mr. Walker's own suite consists of two offices, his own and the consultation room. The consultation room is paneled in hardwood and presents a very attractive appearance.

The third floor is devoted to storage space for lighter material and club rooms for the employees. The club rooms contain a billiard table, shower baths and locker rooms, which form part of a complete and up to date club.

Mr. Walker is president of the California Electragists, and believes in getting the word "electragist" before the public. The sign across the front of his establishment reads, "H. H. Walker, Electragist."

Volt LOSS	#14 15 A	#12 20A	#10 25A	#8 35A	#6 50A	#4 70A	#3 80A	#2 90A	#1 100A	#0 125A	#00 150A	#000 175A	#0000 225A	250 250A	300 275A	350 300A	400 325A	500 400A	600 450A	700 500A	800 550A	900 600A	1000 650A	1500 850	2000 1050
1.0	13	15	19	21	23	27	30	33	38	38	40	43	42	44	49	52	55	57	61	64	66	68	70	80	87
1.5	19	23	29	33	36	41	46	50	59	59	62	66	64	67	75	80	84	88	93	97	100	105	108	123	133
2.0	25	31	39	44	48	52	61	70	78	78	82	88	85	90	100	105	112	117	125	130	133	138	143	163	175
2.5	32	39	49	52	60	70	76	86	100	100	105	110	108	102	125	134	140	146	155	160	167	173	176	205	220
3.0	38	47	59	63	72	82	92	105	120	120	125	132	128	135	150	160	170	175	185	195	200	206	215	245	265
3.5	45	52	69	76	85	98	108	120	136	136	145	155	150	155	175	185	195	200	215	225	230	240	245	285	305
4.0	50	62	79	90	98	112	124	140	156	156	165	175	170	180	200	210	222	230	245	255	265	275	280	325	350
4.5	58	71	89	100	110	125	138	155	175	175	185	195	190	200	225	235	250	260	275	285	295	310	315	365	395
5.0	64	80	100	110	120	140	155	175	195	195	205	220	212	220	250	265	280	290	310	320	330	345	350	410	445
6.0	76	96	118	132	145	168	184	210	235	235	245	260	252	265	300	315	330	345	370	385	400	415	425	490	530
7.0	90	110	138	154	170	195	215	240	270	270	285	305	295	310	345	365	390	400	430	450	465	485	495	570	620
8.0	102	126	156	175	195	220	245	275	310	310	325	350	336	355	400	420	450	465	490	515	530	550	565	660	710
9.0	115	141	176	195	220	250	275	310	350	350	365	390	380	400	450	470	500	510	560	580	600	625	640	740	800
10.0	128	156	195	220	240	280	305	345	390	390	405	440	420	445	500	530	560	580	620	650	670	700	710	820	890

Voltage drop must be considered in practically every installation made by a contractor. The above table gives the maximum distance (one way) in feet over which a given current may be carried with a given volt loss. The minimum wire size is based on the requirements of the National Electrical Code. This table was prepared by E. Earl Browne, manager of the San Francisco Electrical Contractors and Dealers Association.



This chart graphically presents the reason why lighting bills are higher during the winter months. It also can be used in selling a customer better lighting by pointing out the greater length of time artificial light is necessary.

Electroliers Installed in Tract with Electric Home

The Marin County Electrical Development League recently sponsored an electric home in Morningside Court, a subdivision in Marin County between San Anselmo and Fairfax. During the ten days that the home was open 3,605 people visited it. A large number of these were interested in particular electrical features which were installed.

The home was one that was within the price range of the average person, selling for approximately $8,000. It was complete in its electrical equipment, including a Frigidaire electrical refrigerator, a Universal range, and a Scheeline water heater. Several makes of air heaters were used, including Wesix, Majestic and Scheeline. The home was built by W. R. Quigley.

Electroliers were installed in the tract by G. R. Maclaren, an electragist of Fairfax. Twenty-one No. 876 Union metal standards were installed. These are 11 ft. 6 in. in height, and each is topped with a 250-c.p. lamp consuming 6.6 amp.

Questions and Answers on the Code and Safety Orders

Arrangements have been made with Claude W. Mitchell, electrical engineer of the Board of Fire Underwriters of the Pacific, to answer through the columns of the Journal of Electricity such questions on the National Electrical Code as are of general interest.

Similar arrangements have been made with George E. Kimball, electrical engineer of the Industrial Accident Commission of the State of California, to answer questions on the Electrical Safety Orders issued by the Commission.

While it is the object of this department to assist in a better understanding of the Code and the Safety Orders, replies given are not to be considered as official interpretations applying in all instances, as some of the rules permit of varying interpretations under different conditions. The questioner should be guided by the inspection department having jurisdiction.

All who are interested are invited to send in their inquiries regarding the National Electrical Code to Claude W. Mitchell, Board of Fire Underwriters of the Pacific, Merchants Exchange Building, San Francisco, Calif., or to the Editor, Journal of Electricity, 883 Mission Street, San Francisco. Questions on the Safety Orders should be sent to George E. Kimball, Industrial Accident Commission, State Building, Civic Center, San Francisco, or to the Editor.

Q. Where is concealed knob and tube wiring permitted?

A. Electrical Safety Order 703-9 (a). Concealed Knob and Tube Wiring: This class of wiring should not be confused with open wiring (see Order 703-10) but is construed to mean wiring installed within the finished walls of buildings and in normally not readily accessible places where the wiring would not be exposed to accidental contact or mechanical injury. Such locations as attics and spaces under buildings and similar spaces which are not used, or liable to be used for the storage of material, supplies or junk, may be wired knob and tube, subject to the approval of local inspection departments. Many municipal inspection departments have requirements which prohibit the use of knob and tube wiring within certain restricted zones, and all such ordinances which require a higher standard of safety take precedence of the Electrical Safety Orders. The clause, "shall not be used except where expressly permitted by other sections of these orders" probably will be modified to read, "and by permission of the electrical inspection department having jurisdiction" in the next revision of the orders. The "other sections of these orders" referred to are Order 707-1 (d) and Order 711-4 (a). Briefly, the application of the Electrical Safety Orders by the Department of Safety may be considered to permit concealed knob and tube wiring within the finished walls of buildings and in normally not readily accessible locations, subject to local regulations. This is assuming that the local department is enforcing wiring requirements of a standard not lower than the Electrical Safety Orders.

Q. Are meters properly grounded when mounted on a metal meter panel which is part of an all-metal deadfront switchboard which is grounded?

A. Electrical Safety Order 707-10 (h) requires that the frames of meters and meter transformers be grounded under the same conditions that other equipment, appliances and devices would require grounding. [See Order 704 (a).] The method, however, is different. Grounding should be done as required for meters located in metal cabinets. See Order 707-10 (b).

Q. Will Electrical Safety Order 709-2 (g) prohibit switches which have the door interlocked with the switch handle?

A. No. It was the intent of the committee in writing the order to require means of access to the blades and fuses of a switch for inspection while it was in the closed position. If installed in a circuit which may be deenergized, and the switch cover then opened, a switch with an interlocking cover may be used. Enclosed switches which are not too readily accessible for the storage of supplies are obviously safer in some locations than switches with conveniently swinging doors.

Q. Should a delta-connected bank of transformers for 440-volt power be grounded?

A. No. The neutral tap of one of the three transformers in a delta-connected bank must be grounded in all cases where the difference in potential exceeds 150 but does not exceed 3,000 volts. See Electrical Safety Order 704-2 (d).

Electric home sponsored by the Marin County Electrical Development League. One of the electroliers installed in the tract is shown in the foreground.

Concealed Lighting Installed in Home.—J. E. Oust, Jr., electragist of Merced, Calif., has completed an all-electric home in that city for E. M. Baker, in which the general lighting is secured from concealed sources located in alcoves. Included in electrical equipment in the home is a Hotpoint range and water heater, and six Magnaray air heaters of the flush type, ranging from 3 to 6-kw. capacity each.

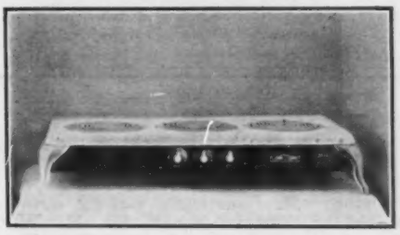
Beverly Hills Requires Bond From Electrical Contractors.—A new electrical ordinance became effective in Beverly Hills, Calif., on Jan 1, 1926. It is patterned after the ordinance now effective in the city of Los Angeles and will require each contractor to deposit $100 registration fee and give a surety bond in the amount of $1,000.

Co-operative Advertising Is Used by Electragists

Electragists in southern California are using co-operative advertising campaigns as a means of selling the electragist idea to architects, builders and owners. These campaigns are being conducted by a number of local groups of electragists including San Diego, Pasadena, Glendale, Burbank, Compton and Beverly Hills.

Most of this advertising is appearing on the builders' pages of the local newspapers; some of the groups are using one and others two mediums. The electragist trade mark is featured prominently in all the advertisements, and many of them carry the explantory clause, "The word Electragist, meaning 'a leader in the electrical contractor-dealer business' is registered as a trade mark by our association, and only members can use it."

The advertising calls attention to the high standards practiced by electragists and assures the reader that a safe and satisfactory installation will be made by them. The names of the electragists in the local district are listed at the bottom of the advertisements as the firms authorized to use the electragist trade mark.



Hotplate on which meal is cooked for subnormal children at San Rafael grammar school.

School Serves to Subnormal Children Meal Which is Cooked on an Electric Hotplate.—One hot meal a day is served to the youngsters in a class of subnormal children attending the San Rafael grammar school. Most of them are undernourished and this meal aids in their development. It is cooked by the teacher of the class on a 3,800-watt 3-burner Hotpoint hotplate installed in the teachers' rest room. An electric water heater is also in the room. The electrical installation was made by H. R. Eklund's Electrical Works, electragists of San Rafael.

Underwriters' Laboratories Publish Review of 1925 Activities.—The Underwriters' Laboratories have issued a report of their activities during 1925 covering all departments. The electrical department had a substantial increase in the volume of work handled, more than 1,000 applications covering a wide range of appliances and materials having been received. The electrical test work done at the San Francisco office measurably increased, reflecting the growth of electrical manufacturing on the Pacific Coast.

The word Electragist, meaning "a leader in the electrical contractor-dealer business," is registered as a trademark by our Association, and only members can use it.

ELECTRICAL SERVICE THIS TRADE MARK Electragist IS YOUR ASSURANCE OF SAFETY

Safety and Satisfaction

You are absolutely assured of safety and satisfaction when you patronize an Electragist, whether for wiring or merchandise.

Knowing full well that service supercedes price he builds his business "up to a standard, not down to a price." High business standards make him dependable.

J. B. MORGAN — THE McNALLY CO.
BARNES BROTHERS — R. H. McCORMICK
ACME ELECTRICAL CO. — WEBB & LUKENS
(ELECTRAGISTS)

The ELECTRAGIST MOVEMENT Is Proving to be just what the public has so long desired—

ELECTRICAL SERVICE THIS TRADE MARK Electragist IS YOUR ASSURANCE OF SAFETY

An absolutely dependable body of electrical contractors, protecting the builder against inferior and unsafe electrical work. By dealing with any of the firms listed below, you are assured of SAFETY and SERVICE.

J. F. ZWIENER, 333-34 — 1224 Third St.
CALIFORNIA ELECTRIC WORKS, Main 272; 357-32 — 420 Eighth St.
C. C. CLARDY, 366-20 — 1015-1017 Market St.
E. R. DAMARUS, Hillcrest 3435-W — 3444 Granada St.
INDEPENDENT ELECTRICAL CO., 354-12 — 928 Seventh St.
MAYER & BOYCE, Main 1853 — 644 Seventh St.
O. W. KARL, Main 6491 — 2188 Logan Ave.
SMITH & DODGE, H 6306 — 4676 Oregon St.
SOUTHERN ELECTRICAL CO., Main 4739 — 806 Third St.

Our New Word

—The word Electragist, meaning "a leader in the electrical contractor-dealer business," is registered as a trademark by our association and only members can use it.

ELECTRICAL SERVICE THIS TRADE MARK Electragist IS YOUR ASSURANCE OF SAFETY

The Electragist Practices High Standards

Whenever you deal with an Electragist you get a square deal. You can be sure of that. An Electragist knows the electrical contractor-dealer business. He knows his costs; his overhead; his turnover; and his customers get the benefit.

These are the reasons an Electragist can practice high standards. And he does this because he knows that maximum profit results to himself as well as to the customer only by so doing.

You can depend on our high practice standards in wiring or merchandising

J. B. MORGAN — THE McNALLY CO.
BARNES BROTHERS — R. H. McCORMICK
ACME ELECTRICAL CO. — WEBB & LUKENS
ELECTRAGISTS

ARCHITECTS AND BUILDERS

ELECTRICAL SERVICE THIS TRADE MARK Electragist IS YOUR ASSURANCE OF SAFETY

like to have this sign on their buildings. It signifies that the electrical work is HIGH GRADE; done by a RESPONSIBLE CONTRACTOR and safe from fire because NO SHODDY MATERIAL IS USED. The following firms are entitled to use the above trade-mark.

SOUTHERN ELECTRICAL CO., Main 4739 — 806 Third St.
J. F. ZWIENER, 333-34 — 1224 Third St.
CALIFORNIA ELECTRIC WORKS, Main 272; 657-32 — 420 Eighth St.
C. C. CLARDY, 366-20 — 1015-1017 Market St.
E. R. DAMARUS, Hlle. 3435-W — 3444 Granda St.
INDEPENDENT ELECTRIC CO., 354-12 — 928 Seventh St.
MAYER & BOYCE, Main 1853 — 644 Seventh St.
O. W. KARL, Main 6491 — 2188 Logan Ave.
SMITH & DODGE, Hlle. 6306 — 4676 Oregon

The word Electragist, meaning "a leader in the electrical contractor-dealer business," is registered as a trademark by our association, and only members can use it.

ELECTRICAL SERVICE THIS TRADE MARK Electragist IS YOUR ASSURANCE OF SAFETY

Built Up to a Standard

Not Down to a Price

Generally when you buy anything you get what you pay for. When you buy from an Electragist you get more than service or merchandise alone, you get the benefit of his knowledge and training that qualifies him as a leader in the field.

An Electragist feels proud that more is expected of him—he knows his higher business standards assure better service and greater value to the customer—moreover he derives a reasonable profit, which is fair.

Play Safe, Consult an Electragist

J. B. MORGAN — THE McNALLY CO.
BARNES BROTHERS — R. H. McCORMICK
ACME ELECTRICAL CO. — WEBB & LUKENS
(ELECTRAGISTS)

PROTECTION

Is a word that means much, and we assure you that it carries its full meaning when applied to the Electragist. The Electragist protects you in electrical transactions. You are assured of safety, service and satisfaction in all service—wiring or merchandising.

You protect your home for safety—you protect your family because you love them—you should protect your electrical work and

Consult an Electragist

He is dependable and trustworthy and has your best interests at heart in his work.

Acme Electric Co. — J. B. Morgan
Barnes Brothers — Webb & Lukens
R. H. McCormick — The McNally Co.

The word Electragist, meaning "a leader in the electrical contractor-dealer business," is registered as a trademark by our Association, and only members can use it.

The advertisements reproduced here are typical of the ones being used by various groups of electragists in southern California.

NEWS OF THE INDUSTRY

Three Portland Utility Companies to Have New Building

A new building to house the general offices of the Pacific Power & Light Company, the Northwestern Electric Company and the Portland Gas & Coke Company, Portland, will rise within the next two years. This announcement was made by Guy W. Talbot, president of those companies, following the recent purchase by him and other interests of a 200-ft. block in the downtown district. The property is bounded by Fifth, Taylor, Sixth and Salmon Streets, and the consideration paid was $550,000. The interests represented by Mr. Talbot will retain the west half of the block facing Sixth Street, while the other interests involved have acquired the other half.

Initial plans for buildings for the use of the utility companies call for a twelve-story, $1,000,000, steel and concrete building on the northwest quarter of the block, and two stories of a building ultimately to be twelve stories high on the southwest quarter. The three utility companies will use all of the small building and nine stories of the high building until their growth necessitates their expanding into the other three floors. Further expansion can be taken care of by completion of the south half of the building. The ground floor of both buildings will be designed to accommodate customers paying bills, and to house the merchandise display and stores of the Northwestern Electric Company and Portland Gas & Coke Company.

Leases of the Pacific Power & Light Company and Portland Gas & Coke Company in the Gasco Building expire in about two years, as does the lease of the Northwestern Electric Company in the Pittock Block. Hence it is announced that the new building will be ready for occupancy before that time, and tentatively, that it will be commenced next fall. The name of the building is to be the Public Service Building.

Awarding of Mayfield Site Ends Cowlitz River Dispute

A large development in electrical power and industrial activities to be started in the next few months is forecast by the announcement of R. K. Tiffany, Washington state hydraulics supervisor, that the Mayfield site, on the much-contested Cowlitz River filings, had been awarded to C. C. Garland of Tacoma, representing the Backus-Brooks Corporation of Minneapolis, which will proceed at once with the construction of paper pulp and insulite mills. Reservoir rights and the appropriation of 3,500 sec.-ft. of water from the Cowlitz River go with the permit just issued.

The Cowlitz water rights dispute has been in progress for nearly four months, and the numerous cases have been under the advisement of the hydraulics supervisor for about two months, following a hotly contested hearing. Mr. Garland's victory automatically brings defeat for H. W. Crozier of Chehalis, who had filed for water rights on sites conflicting with those of Mr. Garland, who was favored, according to Mr. Tiffany, through priority of filing and through the announced assurances of his backers that the development work would be completed more rapidly and be of infinitely greater value to the state (Journal of Electricity, Nov. 15, 1925, p. 391).

G. R. Birkelund, Seattle representative of the Backus-Brooks Corporation, in a letter to the hydraulics supervisor, states that the paper mill and insulite plant will have a daily capacity of about 250 tons and that the latter plant will use mill waste or hogged fuel.

The electrical power end of the project will cost approximately $8,500,000.

Permit also was granted the Cascade Electric Company to divert 1,000 sec.-ft. of water at the mouth of the Cispus River, the water to be carried by conduit 4½ miles, being returned just below the Big Bend of the Cowlitz River. The contemplated development is far enough up the river from the Mayfield site so that it will not interfere with the Backus-Brooks project, the water diverted to be returned above the point where it is needed by that development. The Cascade company was formed by Henry L. Gray, engineer of Seattle, and E. M. Chandler of Olympia, Wash.

Illumination Design Course Date Set by Edison Lamp Works

The Edison Lamp Works will hold its third mid-winter course in illumination, design and sales methods at the Edison Lighting Institute, Harrison, N. J., Feb. 15-20, 1926.

This course is planned primarily for sales and service men of electric service companies. Those who attend will be given a thorough background in illuminating engineering and its application, which will include lectures on special methods which have been found successful in selling lighting installations.

The course of instruction offers to electric service companies an excellent opportunity for training men in illuminating engineering, present lighting practice and the commercial aspects of the lamp business.

All communications regarding reservations, details of the conference and similar data should be addressed to T. F. Joyce, Edison Lamp Works of General Electric Company, Harrison, N. J.

Spokane Company Voluntarily Reduces its Rates

Widespread rate reductions supplying a blanket rate for all towns on the system of The Washington Water Power Company outside of Spokane and revising rates within Spokane and the Spokane Valley district were filed with the Washington and Idaho state officials on Jan. 8.

A new Spokane rate of 5½ cents for the first 32 kw-hr. and 3 cents for additional kilowatt-hours on residential accounts replaced the former rate of 7 cents for the first 20 kw-hr. and 3 cents for additional kilowatt-hours. The minimum of 70 cents per month remains. New commercial lighting rates granting reductions also are given within Spokane.

All new schedules become effective on readings after Feb. 20, 1926. The changes filed voluntarily mean an estimated reduction in revenue of more than $200,000 a year, D. L. Huntington, president, announced.

The most important change is in the 52 cities and towns outside of Spokane served directly by the company, as a large number of widely varied rates now are replaced by new tariffs covering residential, commercial lighting, irrigation and general power service.

Lower irrigation rates are provided in Washington, with an optional rate, new in this pumping district, being provided to care for the small tract owner who needs to develop his land and orchards initially but who does not require continuous service.

New Substations Feature Full Automatic Reclosure

Two more distribution substations recently were placed in service by the Southern California Edison Company. Each of these has full automatic reclosing equipment on the 4-kv. feeders.

South Pasadena and San Marino are served by one of these stations, Garfield substation. This station has 3,000-kva. capacity at 4 kv. and also has facilities for serving the City of Pasadena and the Pacific Electric Railway at 15 kv. when necessary. Three separately regulated 4-kv. circuits and one unregulated double-schedule street-lighting circuit comprise the initial installation.

Covina substation, the second of these two stations, is one of the "residence" type, built of brick and has a high lattice fence concealing the outdoor high voltage equipment. This station has a capacity of 1,500 kva. at 4 kv. and supplies the company's distribution system in and around the city of Covina at that voltage. The initial installation comprises three commercial and one street-light circuit feeding from a regulated bus.

Threaten Moffat Tunnel Suit If Lower Colorado Basin Development Balked by North

Continuing to hold the spotlight, the Colorado River situation brought forth a number of new angles, compromises, and schemes during the past fortnight that would indicate that settlement of its many problems is still in the indefinite future. The Imperial Irrigation District through its attorney, Charles L. Childers, who is now in Washington, has announced its intention to protest against the city of Denver using the Moffat tunnel to take water from the upper Colorado River basin. The new Swing-Johnson bill is claimed to be unlike the proposal of Secretary of the Interior Work for Colorado development on enough points to require a new bill or a compromise. The Norris and Pittman resolutions for the removal of the Colorado, as well as the Tennessee and Columbia Rivers from Federal Power Commission jurisdiction, seemingly has hit a snag in the House. And meanwhile the city of Los Angeles is proceeding calmly to start work on its aqueduct and infiltration canal to the Colorado River, preliminary work having been done on roads and surveys.

Mr. Childers, who is said by news dispatches to be in Washington on behalf of the Swing-Johnson bill, has announced his intention of filing a suit to enjoin the State of Colorado from using the Moffat water-diversion tunnel in diverting water from the Colorado River basin into that of the Missouri River for irrigation and domestic purposes, claiming that the water diverted, sufficient to irrigate 250,000 acres, jeopardizes the water supply of Imperial Valley upon which prior rights are claimed.

The action is contemplated, it was stated, because Colorado and other upper basin states have held that they would oppose any major construction in the lower Colorado River pending unconditional ratification of a seven-state compact. California's ratification of the pact was made with conditional provisions. The move for such an injunction suit is looked upon with grave concern, it is said, by those who wish to bring about an amicable understanding and agreement between all parties. It is felt by them to threaten good feeling and invite a "series of ill-tempered reprisals between sections and municipalities whose mutual welfare depends upon co-operation and good understanding."

The administration has outlined its Colorado River policy in a report made by the Secretary of the Interior on the Swing-Johnson bill. The report was made, it is understood, after Secretaries Work and Hoover had discussed the matter at length with the President.

The report recommends the construction, with federal funds, of a dam in the Colorado River to be 550 ft. high that will create a reservoir of 26,000,000 acre-ft. capacity. The All-American canal, connecting the Colorado River with the Imperial and Coachella Valleys, is held to be an essential part of the plan.

The electrical energy which will be developed in connection with the project should be sold, the report says, at the switchboard to the highest bidder. The purchasers of the power will be in entire charge of distribution, and they must provide their own transmission lines. A unified power plant, Dr. Work contends, is better than the allocation of power privileges as proposed in the Swing-Johnson bill. Joint use of trunk transmission lines, it is pointed out, is no longer an experiment. The benefits of the development under the administration plan are to be available only to the states that ratify the Colorado River compact.

Consideration of the Swing-Johnson bill and the Colorado River report of Secretary Work was to be undertaken at once by the Senate committee on irrigation and reclamation. It was felt in some circles that, although the Work plan and the Swing-Johnson bill were similar in some respects, the wide differences in the matter of ratification of the six-state pact, modification of and financing of the All-American canal, and other phases of the development, would prevent either proposal from getting approval. A third plan, combining the two, was spoken of as a possibility in this event.

Meanwhile announcement comes in news dispatches that the Municipal Water Bureau of the city of Los Angeles will start work on the Colorado River aqueduct which is to bring water 260 miles to southern California. Bids are to be opened Feb. 1 on a contract calling for the dredging of a large infiltration canal which will parallel the Colorado for a distance of about a mile and a half, and from which the water, seeping through the gravel and sand, will be taken into the aqueduct to supply Los Angeles. This project is to be started in the vicinity of Blythe, it is reported.

Approval of the report of Secretary Work to the Senate committee recommending the construction of a dam on the Colorado River by the federal government was expressed by the city council of Los Angeles Jan. 19, 1926. As a further evidence of its approval the council pledged itself to bring before the voters at the next election the question of a bond issue for the building of a transmission line from the Colorado River to Los Angeles for the purpose of transmitting power from any plants which may be constructed on the river. Councilman Charles Randall, who presented the resolution, explained that the purpose of his action at this early date was to make it clear to Congress that Los Angeles is ready to buy a portion of the power which may be for sale after the completion of the Colorado River dam project.

Index for Vol. 55, Journal of Electricity, Ready for Distribution.—An index for Vol. 55 of the Journal of Electricity, covering issues from July 1 to Dec. 15, 1925, inclusive, is now ready for distribution. Copies may be obtained upon request to the Journal of Electricity, 883 Mission Street, San Francisco.

Whatcom County Power Company to Construct Distribution Line.—The Whatcom County Power Company, Bellingham, Wash., plans to construct immediately a 6-mile, 6.6-kv. distribution line along the Pleasant Valley Road at a cost of $9,500.

Expert Appointed to Deal With Rural Electric Problems

Tackling the problem of rural electrification in western Washington in earnest, Henry J. Gille, general sales manager of the Puget Sound Power & Light Company, Seattle, has announced the engagement of John C. Scott, a graduate of the department of animal husbandry of Washington State College, for the purpose of cooperating with farmers, horticulturists, poultrymen and other country residents of the territory served toward the solution of problems involving the

JOHN C. SCOTT

use of electricity. Mr. Scott, it was announced, is the first expert to be employed by any private company in the Northwest for this purpose only.

Especially qualified for his position, it is believed that the service Mr. Scott can render by suggestions and advice will prove invaluable to rural residents of the company territory. Graduating in 1916, with a wealth of experience in the management of large stock and hay ranches in Idaho already behind him, Mr. Scott secured a position with the United States Department of Agriculture and later served as county agriculturist of Franklin County. For the past four years he has been manager of the State Reclamation Service at White Bluffs, Wash., gaining at first-hand experience of the problems attached to irrigation. He also has made a particular study of the application of electricity to the poultry business.

Mr. Scott's headquarters will be in the company offices in Seattle, but it is his intention to visit every part of the company's territory and to give first-hand attention to each individual problem that may be brought to his notice. Data so gathered also will be available for the state committee of twenty-one appointed at Pullman College some time ago to study rural electrification throughout the state.

Oakville, Wash., Votes to Dispose of its Light and Power Plant.—After several months of negotiation and discussion, the city council of Oakville, Wash., has voted to dispose of its present light and power plant and has entered into a tentative agreement with T. E. Donaldson of Elma, Wash., to take over and operate the system under an ordinance franchise until such time as final disposition can be made legal by vote of the people. Mr. Donaldson plans to rebuild the entire distribution system and make other improvements. He took over operation of the plant on Jan. 1.

P. P. & L. Co. Expands in Eastern Oregon and Western Idaho

Three power properties in eastern and central Oregon and western Idaho have passed to the control of the interests allied with the Pacific Power & Light Company, Portland, and will be operated by that company, according to announcement by Guy W. Talbot, president. These properties are the Deschutes Power Company, Prineville, Ore., the Enterprise Electric Company, Enterprise, Ore., and the Grangeville Electric Light & Power Company, Grangeville, Idaho, all formerly owned by interests headed by W. C. Sivyer, maintaining executive offices in Spokane. The stated consideration was $1,850,000, and the sale is subject to approval by the stockholders. The Inland Power & Light Company, now owning several units operated by the companies of which Mr. Talbot is president, will acquire title to the purchased properties.

Coincident with the announcement of the purchase are announced plans for tying in two of the properties with existing properties of the Inland Power & Light Company. The Deschutes Power Company's system will be connected with the Bend Water, Light & Power Company, Bend, Ore., by a 22-kv. line from Culver to Bend, a distance of about thirty-five miles, and a similar line eighteen to twenty miles long from Reubens to Lapwai, Idaho, will connect the Grangeville system to the recently acquired Lewiston, Idaho, property, now connected to the Pacific company's Yakima-Walla Walla system.

The Deschutes Power Company, serving Prineville, Redmond, Culver, Madras and other central Oregon communities, has its principal source of generation on the Crooked River at Cove. The plant contains two units totaling 1,200-kw. capacity. The towns are connected by about eighty miles of 22-kv. transmission line. The Enterprise Electric Company serves Joseph, Enterprise, Lostine and Wallowa, Ore., and receives power primarily from an 800-kw. plant at Wallowa Falls, on the river of that name. Some thirty miles of 11-kv. transmission line connect the communities served. The Idaho property consists of two hydro-electric plants, one on the south fork of the Clearwater River and one on Lolo Creek, and a small steam plant at Orofino, with 22-kv. connecting lines extending between Grangeville on the south and Orofino on the north, with branches east to Kamiah and west to Reubens. Other communities served are Craigmont, Nez Perce, Ferdinand and Cottonwood.

A New Electric Refrigerator Company Formed

The Couzens Ice Machine Company is the name of a newly formed electric refrigerator corporation in Michigan with a nominal capitalization of $1,000,000, the stock of which is held almost exclusively by United States Senator James Couzens, who announced the organization of the new concern. Officers of the company are: president and executive head—James Couzens; vice-president and treasurer—Frank Couzens, who is the senator's son; secretary—Clarence E. Wilcox. James A. Martin and Ross Schram, formerly associated with Senator Couzens in other enterprises, also will be connected with the new company. The formation of this company marks the return of Senator Couzens, formerly with the Ford Motor Company, to the industrial world after an absence of ten years.

In commenting upon the type of refrigerator to be built by the new concern, Senator Couzens stated it would be suited for mass production, extremely simple and placed upon the market complete with box for less than half the price of the machines sold today. "We have made a very exhaustive investigation and have reached the conclusion that one of three machines can be produced along these lines," said the senator.

Seattle Manufacturer Occupies New Shop Building

Outgrowing the cramped quarters which the concern has occupied since 1909, the Electric Heating & Manufacturing Company of Seattle completed and moved into its new factory building last fall. The new structure is located at Sixth North and Harrison Streets. It is of steel and concrete and provides three floors of office and factory space.

The company recently established an agent in Florida, besides the two representatives previously established in Los Angeles and San Francisco. It manufactures electric air heaters, water heaters, glue pots, chocolate tables and heavy-duty air heaters.

New three-story factory and office building of the Electric Heating & Manufacturing Company of Seattle.

Pacific Power to Build New Line to Prospect Point

The Pacific Power & Light Company of Walla Walla, Wash., plans to spend between $65,000 and $70,000 during 1926 in improvements to the company's service in Walla Walla and adjacent localities, according to R. P. Bragg, district manager. A new high-power line to Prospect Point district to cost $28,000 is the principal item. Others include replacement of the Sixth Street feeder, a new gas bench and new transmission lines.

The company's 1925 program, just completed, cost more than $100,000. The last work is that on the Walla Walla River where improvements costing $12,000 were made.

Seattle Awards Electric Range Contract.—The Board of Public Works, Seattle, has awarded contract to the Pacific States Electric Company for furnishing thirty electric ranges for the municipal light department, on a price of $2,282. Hot point ranges were specified.

Seattle Plans for Additional Development of Skagit

Mayor E. J. Brown, of Seattle, has signed an ordinance authorizing J. D. Blackwell, city engineer, and J. D. Ross, superintendent of the light department, to apply to the United States Department of Agriculture for a permit for additional development of electric power on the Skagit River.

A permit from the city for development at Ruby Creek already is before the department. Since this application was made, however, the Skagit engineering commission recommended that a dam and power plant be built at Diablo Canyon. The measure signed by the mayor extends the application to include development at the canyon.

The city of Seattle recently filed application with R. K. Tiffany, state supervisor of hydraulics, for water and reservoir rights on an $11,000,000 expansion of the Skagit River power project in eastern Whatcom County.

The expansion is planned to be undertaken not later than Jan. 1, 1928, and when completed will generate a total of 120,000 hp. in utilizing a 300-ft. fall to the power plant proposed at Diablo Canyon. Work of completing the development will require three years, it is estimated. The reservoir needed will have a dam of concrete construction 350 ft. high. The water will submerge 700 acres of ground to a depth of from 100 to 320 ft. in the storage of 90,000 acre-ft. Seven steel headgates will be required. The city also seeks a further appropriation of 3,500 sec.-ft. of water from the Skagit River and all of its tributaries beyond Diablo Canyon in eastern Whatcom County.

L. A. Gas & Electric Issues New Employee House Organ

Announcing the creation of a new department, namely the public relations department, a new four-page house organ designed for employee circulation was started Nov. 1 by the Los Angeles Gas and Electric Corporation. The name of the publication is "Overhead and Underground."

The L. A. Gas Monthly, formerly the only house publication issued by this company, is to be confined to more formal exposition of construction and operation methods and policy material, and under a new name is to appear quarterly instead of monthly as formerly, it was announced in the new publication. The new paper itself is to be issued twice monthly, and is to be mailed to employees' homes. C. F. Stanley is the editor.

Announcement of the formation of the public relations department in the first issue states that this department will be a consolidation, under one head, of the public relations features formerly assumed by several departments. The offices of manager of public relations, advertising agent, superintendent of employees, and of the special agent, insofar as the latter office deals with public relations, are to be consolidated under the new department. Employee relations and public relations thus will be brought under one head, including personnel work.

D. L. Scott, formerly advertising agent, has been appointed public relations manager in charge of this department.

Commission Issues Permit for Project Near Portland

To permit of the ultimate development of about 100,000 hp. on the Zig Zag, Salmon and Sandy Rivers in Clackamas County, Ore., the Federal Power Commission has granted a preliminary permit for two years to the Oregon-California Hydroelectric Company, Portland. Using the water of these rivers diverted into a common storage of 46,000 acre-ft., behind a dam 145 ft. high, the project contemplates development by successive units, the first of which is estimated at a capacity of 60,000 hp. This is to be located near Marmot about twenty-eight miles east of Portland. Four other smaller units, utilizing the same flow, are projected at present. Final plans have not been announced as the preliminary engineering work has not yet been completed.

The Oregon-California Hydroelectric Company is headed by Sam Connell, Portland, president. Herman Kolberg, San Francisco, is general manager, and S. B. Vincent, Portland, is secretary-treasurer. It is said that arrangements for the financing of the project have been made and that construction will be commenced soon if reports of engineers are found to be satisfactory.

New Building for L.A. Gas and Electric Company Shops

The Los Angeles Gas and Electric Corporation is to start work immediately on the construction of a three-story building for the use of the electric distribution department. The building, which will occupy a site between Pico and Fourteenth and Wall and Myrtle Streets, will have a total floor space of approximately 60,000 sq. ft. It will house the offices of the department, the electric meter-testing laboratory, the transformer-testing laboratory, the electric meter-repair shop, and a branch of the corporation's storeroom which will handle all except the largest and heaviest electrical supplies.

Ample provision has been made to care for the comfort and welfare of the thousand employees of the department. A large and well equipped locker and washroom and an assembly hall are the chief features of this nature. In addition, the new location will provide garage and yard space for the 100 or more cars and trucks used in the corporation's electric distribution service.

The cost of the new building and yard will total about $400,000, and they are expected to be ready for occupancy by the middle of February, 1926.

Feather River Company Awards Buck's Creek Contract

Contract has been awarded by the Feather River Power Company of San Francisco to R. C. Storrie & Company for the construction of its Buck's Creek hydroelectric power project on the North Fork of the Feather River. (Journal of Electricity, Oct. 15, p. 306.)

The contractors are to supply all materials, equipment and labor and construct the entire project for $7,691,889. The plant is to be completed by Dec. 31, 1927.

News Briefs

Salt Lake City Chamber of Commerce Joins Colorado River League.—The Chamber of Commerce of Salt Lake City officially has become a member of the Colorado River League, along with similar bodies in the other upper basin states, Colorado, Wyoming and New Mexico, and will enter into the fight to obtain the ratification of the Colorado River compact. The Salt Lake chamber had a special representative present at the senatorial committee meeting held in Los Angeles Oct. 26, for the purpose of discussing different problems relative to the development of the hydroelectric resources of the Colorado River.

Acquire System in Colorado.—Breckenridge, Colo., has been added to the system of the Public Service Company of Colorado in the recent purchase by that company of the distribution system of the Tonopah Placers Company. This placer mining company heretofore has purchased power from the Public Service Company for its own requirements and those of other Breckenridge residents. No change in policy or personnel has been made by the purchasing company.

Los Angeles Installed 203 Miles of Ornamental Street Lighting in 1925.—During 1925 there were 203 miles of ornamental street lighting systems completed in Los Angeles, according to a report by Frank L. Shaw, chairman of the city council committee on traffic and lighting. In 1924 84 miles of lights were installed. Twenty-seven contracts which have been let but not completed at the present time call for 21 miles more. Sixty-five contracts calling for 76 miles of lights are under consideration, while it is estimated that approximately 500 petitions are being circulated which will result in an additional 200 miles of lights. The number of posts installed to date is 15,709. The total value of the systems installed in 1925 was $2,540,942.

Seattle City Light Department Establishes New Store.—The City Light Department, Seattle, Wash., has established a new store at 4506 University Way for the accommodation of its customers in the University district, Seattle's largest suburb. A complete line of electrical appliances will be carried.

Utah Utility to Wholesale to Idaho Town.—The town of Arco, Idaho, county seat of Butte County, has signed a ten-year contract with the Utah Power & Light Company for wholesale electric power. The town owns its distributing system and will distribute the service to its customers at retail.

Northwest Electric Light & Power Association

Technical Section Committees Studying Many Subjects

At a meeting of the executive committee of the Technical Section in Spokane recently progress in the work of a number of the subcommittees was reported. In general the section is studying problems of particular interest to Northwest utility companies, though many of the forthcoming reports will have a significance not confined to this geographic division.

The accident prevention committee is looking into possible means of abating the hay-derrick hazard, the tree-trimming hazard and the radio-aerial hazard.

The prime movers committee is making a study of the methods of handling hogged fuel, with a view to finding a cheaper way to unload from a barge to a receiving dock.

The overhead systems committee is continuing its investigation of the life of treated and untreated poles, commenced last year.

The hydraulic power committee is studying the economic design of hydroelectric plants, taking into consideration load conditions and the other plants on the system in the hope of being able to define certain standards that might be used in laying out a system in which hydroelectric plants form the major source of generation.

The meter committee is determining the losses in instrument transformers under varying conditions.

The underground systems committee is working out a standard design of manholes and arrangement of equipment. It also is studying the different methods of locating cable faults.

The inductive co-ordination committee is continuing its study of the causes of radio interference.

Some of these subjects will be discussed at the third annual general meeting of the section in Seattle, March 11 and 12, 1826.

Northwest Engineers to Attend Technical Meeting.—At the meeting of the executive committee of the Technical Section in Spokane in January the following were chosen as delegates to the group meeting of the Technical National Section in Kansas City, Mo.: R. R. Robley, operating engineer, Portland Electric Power Company, Portland; J. B. Fisken, consulting engineer, The Washington Water Power Company, Spokane; and Z. E. Merrill, assistant general manager, Mountain States Power Company, Albany, Ore. At the same time the following alternates were chosen: G. E. Quinan, chief electrical engineer, Puget Sound Power & Light Company, Seattle; E. F. Pearson, electrical engineer, Northwestern Electric Company, Portland; and R. E. Thatcher, superintendent of service, Central District, Puget Sound Power & Light Company, Seattle.

Pacific Coast Electrical Association

Technical Conclave at San Francisco Provides Busy Time for All

As usual the conclave of the Technical Section was a beehive of activity. The meetings were held at the Fairmont Hotel in San Francisco, and every minute of the three-day session was utilized to advantage by the nine regular committees of the section in the furtherance of their work. In fact constant driving on the parts of the various chairmen was necessary in order to get through the work on hand.

Widespread discussion of the many reports submitted gave a true indication of the genuine interest of all in attendance at the meetings. R. R. Cowles, Pacific Gas and Electric Company, general chairman, sounded the keynote of the sessions in demanding "business first" throughout the three days of meetings.

All committees have their work well in hand, and in several cases portions of it are completed already and will be presented shortly in the form of serial reports. The change in plan to provide that serial reports should be issued upon completion of a designated portion of a committee's work instead of holding all reports until convention time was adopted about a year ago. However, the benefits of the new plan only are beginning to be felt. The serial report plan, together with the vice-chairman plan which was adopted last spring, will do much to further the continuity of the work of the section. This is obvious even at this early date. The plan permits of the acceptance of new subjects for study as these new subjects develop instead of holding them over until the beginning of a new fiscal year. Chairman Cowles urges the full use of serial reports by all committees.

Two general meetings each drew a large attendance. The first of these was a luncheon meeting held at noon Thursday, Jan. 14. Each of the committee chairmen who attended the Detroit meetings of the Technical National Section gave a brief outline of the activities at those meetings. L. S. Ready, chief engineer of the California Railroad Commission, was the principal speaker at this meeting. He outlined some of the many differences in utility operation under conditions of competition and under the present condition of regulation. Candor featured the speaker's discussion in which he weighed each condition in the balances. Stating that while from the viewpoint of the consumer, there are some possible benefits to accrue from competition there are more benefits to all concerned to be realized under regulation. Some of these latter are standardization of construction, standardization of equipment, standardization of service, definite plans for future development, and definite plans for continuous improvements. Mr. Ready stressed the fact that free and common interchange of technical and operating information between and among electrical utilities, as well as with other utilities, was essential to their continued economical operation; and further, that nothing whatever is to be gained by the failure to participate in full interchange of ideas of design and operation or of those making for increased efficiencies.

The second general meeting was held Friday evening. This was a joint dinner meeting with the San Francisco Section of the American Institute of Electrical Engineers. The dinner part of this meeting served admirably as a social feature in conclusion of the series of committee meetings and the technical discussions that followed the dinner served in a similar capacity to wind up the technical features of the sessions. J. A. Koontz, electrical engineer, Great Western Power Company, was the feature speaker, and his subject was "Mechanical Appliances in Line Erection." Mr. Koontz outlined the labor-saving machinery and appliances used by his company in the construction of its new 220-kv. tie line in the San Joaquin valley. Several slides and a reel of moving pictures illustrated Mr. Koontz's talk. Following Mr. Koontz was W. D. Hannun, of the Pacific Gas and Electric Company, and V. W. Dennis and J. S. Gray of the Pacific Telephone & Telegraph Company, who outlined the line-erection apparatus used by their respective companies.

No attempt is made herein to review the detailed activities of the meetings of the various committees. These are set forth in the brief summaries prepared by the committee chairmen that appear in the following paragraphs.

Accident Prevention Committee

J. M. BUSWELL, San Joaquin Light & Power Corporation, Fresno, Chairman.

Extensive and lively discussion of the subjects previously announced for this year's study by the committee marks the two days that the committee was in session. Preliminary reports in most cases were the subjects of the discussions. These reports are to be completed and improved for final presentation. Most of them are expected to be ready for publication in the convention issue of the Journal of Electricity. Others will be discussed further at the Fresno meetings in April and then presented at the convention in June for subsequent publication.

"Tools" and "Safe Practices" were the titles of the two principal papers discussed at the San Francisco meetings. Two subjects assigned by the national committee, "Tree Trimming" and "Identification of Cables," were given considerable attention. Safety in underground work and in station operation were as prominent in the discussion as was line safety. A most interesting exhibit of safety appliances and equipment was prepared by S. C. Dickinson and C. A. Jordan of the Pacific Gas and Electric Company. This exhibit attracted the attention of the whole technical delegation.

At the Fresno meetings the further discussions, particularly on "Safety Code," "Accident Statistics" and "Safe Pole-Handling Methods" assuredly will be as interesting and valuable as they are important. Another interesting exhibit is to be given there, and a full attendance is urged.

Hydraulic Power Committee

WALTER DREYER, Pacific Gas and Electric Company, San Francisco, Chairman.

R. S. Quick of the Pelton Water Wheel Company, San Francisco, gave a very interesting paper, "Comparisons and Limitations of Various Theories of Water Hammer." In this paper Mr. Quick derived in a simple manner the so-called exact formula for water hammer, the final equation being the same as that used in the theories of Allievi, Durand and Norman Gibson. The approximate formulae of Johnson, Vensano, Warren and A. H. Gibson also were explained, and the limitations of each pointed out. The so-called exact formulae still retain limitations in that no allowance is made for variation in diameter of conduit or for branching pipes and their influence on reflected waves. A general discussion on suggested tests covering these points and on the subject of the degree of reflection obtained with and without the water-wheel units running followed the presentation of the paper. Tests to be made by the Pacific Gas and Electric Company and by the Southern California Edison Company then were described.

A review of various types of relief valves, deflecting nozzles and deflecting hoods was given by E. A. Crellin of the Pacific Gas and Electric Company, San Francisco. Mr. Crellin used a number of slides to illustrate his talk. The apparatus which was described is used in conjunction with long pressure-pipe installations to prevent excessive pressure changes and to afford better speed regulation of the hydraulic units operated on such lines.

An instructive talk was given by J. P. Jollyman, Pacific Gas and Electric Company, San Francisco, on "Vibration in Hydraulic Turbines." In this talk Mr. Jollyman explained the causes and possible dangers of this trouble and the comparatively simple manner of either preventing or eliminating the disturbance. Further indication also was given of the possibilities of the use of the device developed by Roy Wilkins (Pacific Gas and Electric Company, San Francisco,) which combines a pressure element and an oscillograph to measure and record pressure changes of any magnitude and any frequency.

A summary of data on the obstruction of water flow in conduits due to vegetable and animal growths was given in a paper presented by C. De Witt of the Pacific Gas and Electric Company. These growths may cause a heavy reduction in flow capacity of

flumes, canals, pipe lines or other hydraulic conduits. Methods of prevention and removal were discussed generally.

J. M. Gaylord, of the Southern California Edison Company, gave a brief resume of the present status of the experimental work of Mr. Cummings of the California Institute of Technology, Pasadena, on the subject of evaporation losses from reservoirs.

Penstock-design discussions occupied the second day's sessions. New developments in expansion joints and bends, painting experience and practice, experiments on friction losses, and new types of welded and seamless pipes were described. Mr. Jordan's detailed description of the new Balch plant of the San Joaquin Light & Power Corporation was read and aroused much interest. This plant is the first of three "super-head" plants to be constructed.

Meter Committee

R. G. JONES, Southern Sierras Power Company, Riverside, Chairman.

Progress reports were read by each subcommittee chairman, and each was followed by lively discussion. It is assured definitely that the short course for metermen will be held at the University of California in Berkeley during the coming year. Further, it is planned to hold a parallel course in the southern part of the state, if possible. Definite dates cannot be announced at this juncture but will be given later.

Several new developments in the meter and instrument field were presented to the committee and created much interest. Some new and ingenious devices to make testing more safe were exhibited. These exhibits elicited varying comment. It appears as if some tangible headway is being made toward a solution of the test-facility problem. A device that will be approved as to manner and method by the various operating companies seems not remote.

A report of W. R. Frampton, Southern California Edison Company, who represented the meter committee at the Detroit meetings, was read and accepted.

Prime Movers Committee

J. W. ANDREE, Southern California Edison Company, Los Angeles, Chairman.

Reports were read giving the activities of the national prime movers committee at the Detroit and Philadelphia meetings and covering the assignments of work to the local committee. A synopsis of a report on condenser-tube investigation produced by the national committee was presented, and members of the local committee were advised that copies of this report may be obtained by application to the chairman. C. W. Wiggins, San Diego Consolidated Gas and Electric Company, vice-president, gave a preliminary report for his subcommittee on the subject of condenser-tube investigation. A lively discussion followed this report. F. G. Philo, Southern California Edison Company, Long Beach, reported on the methods to be adopted by that company in the installation of the new 50,000-kw. unit in the Long Beach steam plant for overcoming erosion of condenser tubes at the entrance end. Caustic embrittlement of boilers was discussed at some length. Reference was made to the studies now being made on this subject by the national committee.

C. H. Delaney, Pacific Gas and Electric Company, San Francisco, made a preliminary report for his subcommittee on the burning of liquid and gaseous fuels, presenting tables of data gathered from the operating records of various Pacific Coast companies. Other subjects discussed were the use of floating roofs for fuel-oil tanks, pulsations in furnaces, and furnace temperatures both with gas and with fuel oil.

A joint session was held at which Mr. Philo gave a very interesting illustrated description of the mercury-vapor-turbine installation at Hartford, Conn.

Progress for his subcommittee was reported by C. E. Steinbeck, Pacific Gas and Electric Company, San Francisco, in the matter of power-plant design. Further information and interesting data on water-cooled vs. air-cooled furnace walls are expected to be available for the Fresno meetings.

Heat balance and station auxiliaries were covered in a joint report given by Mr. Philo, who also reported for Mr. Kraps who was unable to attend. A heat-balance diagram for the new Long Beach plant was presented and thoroughly explained. The balance of the session was given over to general discussion in which some of the subjects were evaporators and feed-water treatment; loading, scaling and blowing down boilers; and steam vs. electric drive for plant auxiliaries.

Overhead Systems Committee

G. A. RILEY, Los Angeles Gas & Electric Company, Los Angeles, Chairman.

Satisfactory progress is noted in all branches of the work of the overhead systems committee. Lively discussion at all of the San Francisco sessions evidenced the wide and active interest on the part of those attending.

Preliminary reports on the following subjects were presented:

Life of Treated and Untreated Poles.

Testing of High-Voltage Insulators in Service.

Line Maintenance.

Line Construction Costs.

Grounding of Primary and Secondary Lines.

Distribution Transformer Standardization.

The last two subjects are being studied jointly with the apparatus committee as there is an overlapping in their scope.

No further report on General Order No. 64 was made. The suggestions of last year's committee on that subject were submitted to the California Railroad Commission some time ago and now are under consideration by that body. On the subject of treated and untreated poles it was shown that termites are almost as much of a menace to the life of wood poles in some localities as is decay. This indicates that some method of preservation for the length of pole above ground may be as necessary as for the portion below the surface.

Appreciable saving in costs is reported for outlying districts where liberal use of hot-line insulator testing and line maintenance has been the vogue. Four divisions have been made in the study of distribution transformer standardization:

Electrical Characteristics of Transformers.

Improvement of Fuse Protective Devices.

Terminals, Lead Wires and Connections.

Standard Voltage Ratios.

Each of these sub-topics is being given separate consideration.

Discussion showed the desirability of the development of a standard gage for the 1-in. and the 1⅜-in. pin holes in insulators. A suggested measuring device conforming to N.E.L.A. specifications was submitted for the 1-in. hole. A subcommittee was formed to study this gage and also to make recommendations for a 1⅜-in. standard with a suitable gage.

Safety Rules Committee

W. R. FRAMPTON, Southern California Edison Company, Alhambra, Chairman.

The committee is interested primarily in the furtherance of the Electrical Safety Orders of the State of California and secondarily in other allied matters. This work is tied in closely with the activities of the electrical inspectors, and it is a satisfaction to announce that arrangements have been completed whereby meetings of the Electrical Inspectors Association and the Technical Section will not be held on conflicting dates as heretofore has been the case most of the time.

Opinion was crystallized in favor of new developments in devices suitable for several different methods of testing. Several switch manufacturers' representatives were present with different safety switches which included testing facilities. These switches were shown to the committee. There was general discussion concerning the possibility of adopting uniform regulations regarding test facilities.

Some of the more important features in the Electrical Safety Orders were enlarged upon in a paper presented to the committee. The joint committee on grounding offered preliminary reports for discussion. However, time did not permit the completion of this subject, and the work will be continued for further report at the Fresno meetings in April.

A.I.E.E. News

San Francisco Section. P. J. Ost and N. A. Eckhart of the engineering department of the city of San Francisco, will address the February 26 meeting. Their subject will be the Moccasin Power Development.

Official nomination of H. H. Schoolfield, chief engineer of the Pacific Power & Light Company of Portland, Ore., for vice-president has been announced by Institute headquarters. Mr. Schoolfield will represent the Northwest district in the event of his election.

News of the Electragists

California Electragists Hold Interesting Convention at Catalina

Constructive suggestions for the upbuilding of the contractor-dealer branch of the industry marked the third quarterly meeting of the California Electragists, Southern Division, which was held at the Hotel St. Catherine, Catalina, Jan. 22-23, 1926.

Better merchandising methods and cooperation with power companies were the keynotes of the meeting of the merchandising section which was held Friday afternoon at 2:30. The report of the merchandising committee was read by C. A. Rowley of The McNally Company, Pasadena, Calif. This report recounted the activities and accomplishments of the committee since the Lebec convention and outlined what the committee proposes to undertake during 1926.

Contact with the Southern California Edison Company has been strengthened, and representatives of this company have been attending all of the regular meetings of the committee in order that frank discussion of merchandising and other problems of mutual interest might be had. This has resulted in special sales plans for six months in advance having been laid, and it is believed that the co-ordination of effort in display of merchandise, in advertising, and sales endeavor will return a maximum of benefit possible from such sales.

Plans and specifications for several standard range and water-heater installations have been prepared, and the Edison company has announced flat installation charges based on those plans and specifications. This will allow the quoting of prices of ranges installed.

Electrical refrigeration was considered by the committee, and electragists were urged to investigate its merchandising possibilities, although they were cautioned not to rush into it without study.

During 1926 it is hoped to stimulate a keener interest in the monthly specials and a broader contact with central stations throughout the territory. Merchandising clubs are being sponsored by manufacturers and jobbers, and this work was commended by the committee. Advertising is being studied in an effort to tie in individual advertising with sectional and national advertising programs. Electragists will be urged to capitalize the idea that radio is primarily an electrical device. In concluding its report the committee included the following definition of service: "Not something for nothing; but prompt and efficient attention to the needs of your customer at a reasonable price."

The 1926 merchandising program of the Southern California Edison Company was presented by R. I. Carruthers, assistant sales manager of that company. He stated the electragists would be the beneficiaries of the extensive program if they took advantage of the opportunities which it presents. In speaking of the flat installation charges for range and water heaters according to the uniform plans he said the contractors' overhead would be reduced greatly as the company representative would issue an order to a contractor to install a job at a definite location in accordance with one of the plans. This would eliminate any selling expense on the job, and it would not even be necessary for anyone to see the job in advance of delivery of the material for the installation. After its completion the contractor would make out an invoice to the company and immediately would receive a voucher paying this which would eliminate any collection expense.

Harry Beecher, chief electrical inspector of Los Angeles, was named the "Go-Getter" of the convention for having been the first person to make reservations.

"Domestic Refrigeration in the Electrical Industry" was the subject of a talk by L. B. Williams of Listenwalter & Gough of Los Angeles. He presented some practical sales ideas that could be used by electragists in selling electrical refrigeration, particularly for homes. He stated electrical refrigeration has arrived and that every owner of an automobile or radio has shown that people will buy the things they want.

R. E. Smith, advertising manager of the Southern California Edison Company, addressed the meeting on the subject of advertising for the contractor-dealer. He stated advertising required courage, that it must be concentrated and consistent. Four per cent of the gross volume of the business was the amount recommended for advertising. He advocated that this should be concentrated in newspapers and in only one paper for the dealer doing a yearly volume of $50,000 or less. Mr. Smith cautioned the members relative to the inadvisability of program, congratulatory, and similar advertising. He stated the space should be used in telling a brief, straightforward story. Tie-in advertising with national advertising was urged.

"Store and Window Display" was the subject of an illustrated talk by C. E. Lewis of The Electric Corporation. Practical ideas and methods which could be employed by dealers were shown by Mr. Lewis. He urged the use of hardwood floors or linoleum in the show window and the use of plush or velour in display. Pedestals were recommended for breaking up height levels. Every window display should tell a story and Mr. Lewis gave several examples of what could be done to accomplish this result. Ideas for window displays can be secured from national advertisements, the seasons, holidays and similar sources. Mr. Lewis also touched on the subjects of illumination, display cards, and store arrangement.

This meeting was attended by 156 persons, and O. N. Robertson of the Robertson Electric Company, Santa Ana, Calif., presided.

The members' meeting followed immediately after the close of the merchandising section, and 45 members were present. Harry H. Walker, president of the California Electragists, presided. The report of the executive committee was presented at this time. The plans outlined for the standard range and water-heater installations also were explained in detail.

C. J. (Cy) Geisbush, executive secretary of the association, outlined the accomplishments of the organization since March, 1925. He urged a more active participation in the work of the association by the members.

Harry H. Walker appealed to the individual members to give their financial support to the California Electrical Bureau.

Concurring in the recommendation of the members to the joint executive committee of the state body, the latter committee met and selected Del Monte as the place of holding the annual meeting of both the Northern and Southern Divisions of the California Electragists; the date was tentatively set as some time in August.

The general open meeting was held Saturday morning, at 10:30, President Walker in the chair. The Red Seal plan was discussed by W. F. Brainerd of the California Electrical Bureau. He outlined the history of the plan and the benefits that will accrue to the electrical industry. He also gave a brief outline of the requirements and the method of operation of the plan in California.

W. F. McWhinney, of the Southern California Edison Company, outlined the 1926 program of that company, which includes expenditures totaling $90,000,000.

J. C. Miller, Pacific Telephone & Telegraph Company, Los Angeles, spoke on the need of specifications for telephone conduits and urged the cooperation of the electragists in bringing this about. He stated engineers of his company will render their service gratis in this work.

G. L. Duffey, of the Southern California Telephone Company, called attention to the importance of adequate

conduits for telephone service to owners, builders, architects and contractors.

Harry Harper, manager Graybar Electric Company, Los Angeles, urged the study of the business guide which had been published by the electrical supply jobbers of Los Angeles. He gave a resume of the work which already had been presented to the convention. He emphasized the work which has been done by C. J. (Cy) Geisbush for the association and especially in co-ordinating the work of the various committees.

The banquet was held Friday evening and was followed by a dance. Other entertainment provided for the convention included trips in the glass-bottom boats, auto-stage scenic trips, and golf. The party left Los Angeles Friday morning at 9 and returned Saturday afternoon, leaving Catalina at 3:30 p.m.

Electrical Inspectors of Northwest Organize at Meeting in Portland

With 118 members representing all branches of the electrical industry and all districts of the states of Oregon and Washington, the new Northwest Association of Electrical Inspectors was launched successfully at the first annual convention in Portland, Jan. 11-12, 1926. The enrollment exceeded the expectations of the most optimistic of the sponsors and was responsible in part for the spirit of enthusiasm which was in evidence throughout the two-day meeting. An excellent program of papers and discussion tended to heighten this enthusiasm, which found expression toward the end of the last session in the unanimous vote of the convention to accept the invitation of Longview, Wash., to hold next year's meeting in that city.

Officers elected at the first session Monday morning were: president—L. W. Going, chief electrical inspector, Portland; vice-president—W. P. Weathers, chief electrical inspector, Longview; secretary and treasurer—F. D. Weber, electrical engineer, Oregon Insurance Rating Bureau, Portland; and the following additional members of the executive committee—J. H. Sroufe, of the contracting firm of Jaggar-Sroufe, Portland; J. B. Fisken, consulting engineer, The Washington Water Power Company, Spokane; H. A. Patton, electrical engineer, Washington Surveying and Rating Bureau, Seattle; and H. S. Jenkins, chief electrical inspector, Bellingham, Wash. Two honorary members of the association were elected by the convention, namely: C. W. Mitchell, electrical engineer, Board of Fire Underwriters of the Pacific, and secretary of the California Association of Electrical Inspectors, San Francisco, who brought a message of greeting from that association, and assisted in organization details; and Edward Grenfell, assistant chief of the fire department, and fire marshal of Portland, who addressed the convention on the necessity of co-operation of fire departments with city electrical inspectors.

The afternoon session was opened by a paper on the making of a municipal code, by L. W. Going, in which he discussed the need of such a code to supplement the national code. E. B. Morrison, electrical engineer, Oregon Insurance Rating Bureau, Portland, outlined the changes in the 1925 edition of the national electrical code. The operations of the Underwriters' Laboratories, Inc. were explained by R. J. Larrabee, engineer of that organization, San Francisco. Discussion on these papers, by H. A. Patton, Seattle, F. H. Murphy, illuminating engineer, Portland Electric Power Company, and W. E. Roberts, deputy electrical inspector, Portland, centered around the inadequacy of the 15-amp. rule in the national code, and the inefficiency of the higher amperage fuses and of the clips and contacts of knife switches when operating at loads approaching their rated capacities. R. E. Thatcher, superintendent of service, central district, Puget Sound Power & Light Company, Seattle, entered a protest against the regulation in the national code in which grounding of meter cases in installations over 150 volts is required, stating that to ground the lower voltage meters created a hazard to meter men not offset by benefit to the public.

Radio interference formed the chief topic of discussion at the Tuesday morning session. W. R. Cornell, test engineer, Portland Electric Power Company, Portland, told what the power companies were doing toward discovering the real causes of interference and removing those for which they were responsible, and how the great volume of interference was caused by small appliances in the houses of customers and other agencies beyond the control of the companies. Ellis Van Atta, radio expert, Pacific Power & Light Company, Walla Walla, Wash., amplified Mr. Cornell's remarks, calling attention particularly to the heating pad as being one of the worst disturbers of radio reception. J. B. Fisken introduced discussion of the hazard created by the indiscriminate erection by unskilled persons of radio aerials in close proximity to power lines.

Opening another subject at this session, E. G. S. Pryor, resident engineer, Underwriters' Laboratories, Inc., Seattle, read a paper entitled, "Duties of Field Secretary of National Fire Protection Association," by W. J. Canada, who holds that position, but who was unable to attend this meeting. Mr. Canada's paper pointed out that, after becoming acquainted with inspection practices at variance with the national code, he attempted to acquaint the code-making committees with these variations and to accelerate committee action where such accelerations seemed necessary. Edward Grenfell's talk followed, and was discussed by J. C. Caine, deputy electrical inspector, Portland, who told how the electrical department of the city co-operated with the fire department inspectors.

A subject eliciting considerable interest at the Tuesday afternoon session was an explanation of the so-called "Dealer's License Law" in the Portland code, by J. C. Caine, to whom was delegated the responsibility for proper application and enforcement of this part of the code. Under this law every dealer in electrical appliances or equipment is required to have a municipal license to do business, one of the requirements of which is that he shall install, sell or keep in stock for sale only such equipment as has been approved by the National Board of Fire Underwriters.

A spirited discussion followed the presentation of a paper on the effect of grounding electrical circuits to city water systems, by J. B. Downer, city water department, Seattle. Mr. Downer pointed out the danger to water-company employees created by grounding the neutral conductor of electrical circuits to water service pipes, showing by means of charts how such grounds were often inadequate.

Also on the program at this session was C. H. Lum, assistant general manager, National Board of Fire Underwriters of the Pacific, and general agent of the Underwriters' Laboratories, Inc., San Francisco, who presented a paper on electrical inspection. He was followed by Will Moore, state fire marshal and insurance commissioner of Oregon, Salem, who told something of the relation of his office to the work of those responsible for electrical installations. The code from the viewpoint of an electrical contractor was discussed in a paper by V. S. McKenny, NePage, McKenny Company, Seattle, read in his absence by Roy C. Kenney of the Portland branch of that firm.

A resolution recommending revision of the national code to make conduit necessary in wiring school houses, assembly rooms and public meeting places, and one recommending the limiting of wattage allowed on two-wire branch circuits, were passed and referred to the proper committee for action. The convention also went on record, by resolution, as favoring state legislation regulating the erection of radio aerials to eliminate the present existing hazard. Looking to a simplification of state electrical inspection in Oregon, now being conducted by three separate state departments with consequent duplication, a resolution recommending investigation of and report on this situation by the legislative committee was passed.

The banquet Tuesday evening was addressed by George Sawyer, sales manager, Pacific Power & Light Company; C. P. Osborne, superintendent light and power, Portland Electric Power Company; L. T. Merwin, vice-president and general manager, Northwestern Electric Company; George Boring, manager, Pacific States Electric Company; and Roy C. Kenney, manager, NePage, McKenny Company, all of Portland. J. H. Sroufe acted as toastmaster.

Annual Banquet of Contractors Is Well Attended.—Representatives from all branches of the industry attended the sixth annual banquet of the San Francisco Association of Electrical Contractors and Dealers, which was held in the roof garden of the Hotel Whitcomb on Jan. 16. An interesting program of entertainment was provided by the committee. The banquet was attended by 263 persons and was one of the most successful ever sponsored by the San Francisco Association.

Meetings

Rocky Mountain League Elects Officers for 1926

The annual election of officers of the Rocky Mountain Electrical Co-operative League was held at Salt Lake City, Dec. 28, and the following were elected for the year 1926:

President—George R. Randall, president and general manager of the Salt Lake Electric Supply Company, succeeding C. B. Hawley.

Vice-president—B. E. Rowley, manager Salt Lake City branch of Edison Electric Appliance Company, succeeding George R. Randall.

Secretary - treasurer — R. M. Bleak, superintendent of lighting and appliance sales, Utah Power & Light Co

The following were selected on the board of trustees from the various branches of the industry:

Jobbers—J. A. Kahn, Capital Electric Company; J. M. Perlewitz, Graybar Electric Company; W. J. Berryman, Mine & Smelter Supply Company; H. R. Bygel, United Electric Supply Company.

Contractor-Dealers—George R. Randall, Salt Lake Electric Supply Company; F. C. Wolters, Modern Electric Company; J. V. Buckle, J. V. Buckle Electric Company; G. J. Guiver, Holding Electric Company.

Manufacturers—B. E. Rowley, Edison Electric Appliance Company; W. A. Moser, Westinghouse Electric & Mfg. Company; B. C. J. Wheatlake, General Electric Company; Thad J. Stevens, Stevens Sales Company.

Central Station—D. C. Green, P. M. Parry, H. M. Ferguson and R. M. Bleak, all of the Utah Power & Light Company.

Telephone Company — O. J. Hyde, Mountain States Telephone & Telegrap Company.

Long Beach Electric Club Officers Take Office

At the fifth annual meeting and banquet of the Electric Club of Long Beach, Calif., the newly elected officers fro the ensuing year were inducted into office. R. W. Albright, chief electrical inspector of the city of Long Beach, is the new president. James Henderson, first vice-president, is connected with the Marsh Electric Company at Long Beach. Fritz Ziebarth, second vice-president, and C. O. Wheat, sergeant-at-arms, are both electrical contractors. Vern L. Ringle, secretary and treasurer, is chief appliance salesman of the Southern California Edison Company, Long Beach.

Following the banquet, a program interestingly setting forth the progress of the electrical industry was presented by representative electrical men of the community. G. A. Harper and J. J. Riley, of the newly organized Graybar Electric Company; Myron McNeal, district manager, Southern California Edison Company, Montebello; and E. B. Cummings, assistant district manager, Southern California Edison Company, Long Beach, were the principal speakers of the evening.

Salesmen of Capital Electric Company Hold Conference

The annual salesmen's conference of the Capital Electric Company was held at the company's offices at Salt Lake City for three days beginning Dec. 29. In addition to the company's regular salesmen, there were in attendance at the meetings several members of the local organizations of the General Electric Company and Edison Electric Appliance Company, also M. D. Williams representing the General Electric Company's general merchandising department, of Chicago. The meetings were devoted to discussions and exchange of ideas concerning sales activities for the ensuing year.

On the evening of Dec. 29 the annual banquet was held at the Hotel Utah, at which about 75 guests were present, including employees of the Capital Electric Company, General Electric Company, and Edison Electric Appliance Company. Frank B. Cook, president of the Columbia Trust Company, of Salt Lake City, was the principal speaker, using as his subject, "Utah and Its Possibilities." A talk on "Modern Commercial Distribution" was given by B. E. Rowley, district manager of the Edison Electric Appliance Company, and a speech on "Our Job" was delivered by B. C. J. Wheatlake, manager of the local branch of the General Electric Company. J. A. Kahn, president of the Capital Electric Company, was toastmaster.

COMING EVENTS

National Association of Railroad and Utilities Commissioners—
Kansas City, Baltimore Hotel
Feb. 9-12, 1926

American Institute of Electrical Engineers—
Midwinter Convention in New York
Feb. 8-12, 1926

Technical Section, Northwest Electric Light and Power Association—
Annual General Meeting—Seattle, Wash.
March 11-12, 1926

Electrical Men of Colorado—
State-wide meeting under sponsorship of Electrical League of Colorado
Denver, March 26, 1926

Electrical Supply Jobbers' Association—
Annual Convention—Hot Springs, Va.
May 31-June 4, 1926

Pacific Coast Electrical Association—
Annual Convention—Biltmore Hotel, Los Angeles
June 8-11, 1926

Associated Manufacturers of Electrical Supplies—
Annual Convention—Hot Springs, Va.
June 7-12, 1926

National Electric Light Association—
Annual Convention—Atlantic City, N. J.
June 17-21, 1926

Talks to Employees Delivered by Puget Sound Officials

R. M. Boykin, manager of the central district of the Puget Sound Power & Light Company, is carrying out a plan of talks to employees delivered by a number of company officials best qualified to explain company affairs and to instruct all members of the organization in the problems of management and operation. The first talks were given Dec. 2, the speakers being F. W. Brownell, comptroller, and George E. Quinan, chief electrical engineer. Mr. Brownell talked on "Financial Organization" and Mr. Quinan spoke on "Power Facilities and Growth."

Other addresses scheduled for early date include "Electric Rates," by H. J. Gille, general sales manager; "Transmission and Distribution," by M. T. Crawford, superintendent of distribution, and "Public Relations," by N. W. Brockett.

Electrical Refrigeration Topic of Electric Club Meeting

Electric refrigeration was the topic of the day for the Los Angeles Electric Club meeting of Jan. 11. Arthur Spring, district manager of the Servel Corporation, acting as chairman of the day, introduced his competitors one by one and allowed them to tell their stories but refused to give away any of his own trade secrets. Donald De Fremery, mechanical engineer for the Union Ice & Cold Storage Company of Los Angeles, made an excellent speech, covering the principles of refrigeration.

The rest of the program follows:

History of Domestic Electric Refrigeration—F. L. Pollard, vice-president and general manager, Heesman Pollard company, distributors of Servel; Food Preservation—L. B. Williams, sales engineer, Listenwalter & Gough, distributors of Copeland; Convenience—D. D. McFarlane, sales manager, Newbery Electric Corporation, distributors of Electro-Kold; Central Station Benefits—J. H. Cunningham, manager central station department, General Electric Company, General Electric; Servicing—George Ratterman, sales manager, Delco Light Company, Frigidaire; Merchandising and Future—L. D. Robertson, Pacific Coast sales manager, Kelvinator Corporation, Kelvinator.

Book Reviews

University of Illinois Issues Bulletin on Antenna Investigation.—Publication of Bulletin No. 147, "Investigation of Antennae by Means of Models", by J. T. Tykociner, has been announced by the Engineering Experiment Station of the University of Illinois, Urbana. It contains a discussion of the theoretical considerations involved in the use of scale models of antennas, and a description of different models with which experimental work has been done at the university. Copies may be obtained without charge by addressing the Engineering Experiment Station.

Patents (third edition) and **Trade-Marks** (fourth edition) are two useful little booklets recently issued by Richards & Geier, patent and trade-mark attorneys at 277 Broadway, New York City. The former of these booklets covers patent law and practice both domestic and foreign. Schedules of charges are given. The other booklet covers trade-marks and trade names and their registration, both domestic and foreign. Several pages are given to the discussion of trade-mark piracy. The publications will be distributed gratis to interested persons.

Personals

S. M. Kennedy, vice-president in charge of business development and public relations, Southern California Edison Company, Los Angeles, recently had an unfortunate accident which resulted in a broken hip and arm, which will cause an enforced absence from business for at least three or four months.

C. W. Wiggins, superintendent of electric production, and **K. B. Ayres,** superintendent of electric distribution, represented the San Diego Consolidated Gas & Electric Company at the P.C.E.A. Technical Section committee meetings in San Francisco recently.

L. W. Failor, for a number of years manager of the offices of the Puget Sound Power & Light Company at Auburn and Sumner, Wash., has been transferred to Olympia, Wash., where he will have charge of the sales department of the company. He has been succeeded at Auburn and Sumner by **Roy McGandy,** who has been with the power department of the company for many years.

H. L. Jackman, manager of the Eureka division, Western States Gas & Electric Company, Stockton, Calif., has been appointed assistant to **H. H. Jones,** newly elected vice-president and general manager of the company. In addition to his duties as assistant general manager of the company, Mr. Jackman will continue in his position as manager of the Eureka division.

H. J. Gille, general sales manager, Puget Sound Power & Light Company, Seattle, was the guest of honor at a dinner tendered him recently by officials and fellow employees at the Olympic Hotel in that city. The guests were: **A. W. Leonard,** president; **W. H. McGrath,** vice-president; **F. H. Brownell, Hugh Tait, Harry B. Sewall, George Newell, W. J. Grambs, E. A. Batwell, James Wilmot, R. W. Clark, Dwight Ware, E. A. Crider, D. J. Tarrance,** and **A. G. Gordon. George Quinan** acted as toastmaster.

H. L. Barker, president of the Meadows Manufacturing Company, Bloomington, Ill., has been making the rounds of the Pacific Coast territory, accompanied by **Clifford A. Williams,** the company's Western sales manager. Not long ago he spent considerable time in San Francisco.

Arnold Pfau, in correcting a statement published in the Jan. 15 issue of the Journal of Electricity to the effect that he is president of the American Resistor Corporation, states that he was president of the American Resistor Company but that its assets have been taken over by the American Resistor Corporation and the company has ceased to exist. Mr. Pfau, the "old crowd" of the American Resistor Company, and the technical staff still are connected actively with the corporation, whose president is **Joseph A. Steinmetz** of Philadelphia. **W. E. Duersten** is vice-president and general manager in charge at the Milwaukee offices and works.

P. P. Pine, power sales engineer, San Diego Consolidated Gas & Electric Company, represented that company at the recent meeting of the Commercial Section, National Electric Light Association, in Chicago.

E. H. Pim, sales agent for the General Electric Company in Seattle, left recently for Los Angeles to attend the funeral of his father. The latter was connected years ago with the Canadian General Electric Company in Vancouver, B. C.

Tom Wood, Seattle representative of the Packard Electric Company, and vice-president of the Electric Club of Seattle, left early in January for a six weeks' business trip throughout the East. On his trip he will visit Chicago, New York, Canton and Columbus, Ohio, returning via Los Angeles and San Francisco.

E. S. Jenison, for five years general sales manager for The Goulds Manufacturing Company, Seneca Falls, N. Y., has become associated

E. S. JENISON

with Smith Booth Usher Company as vice-president and resident partner in San Francisco. He brings to the position an experience in engineering and sales work which makes him particularly well fitted for his new duties, for he spent two years in Porto Rico for the Otto Gas Engine Works, one year with Henion & Hubbell, Chicago, and thirteen years in the service of the Goulds Manufacturing Company. For that company he served three years with the Canadian Fairbanks Morse Company, Montreal, as manager of the pump, engine and electrical departments, and five years as manager for the Goulds company in Philadelphia, succeeding then to the position he recently left to form his new connection. Mr. Jenison is a native of Republic, Ohio, and a graduate from the University of Michigan in mechanical engineering.

A. F. Krippner has been appointed sales representative for Colorado for the Jeffery-Dewitt Insulator Company, Kenova, W. Va., and the Champion Switch Company, Buffalo, N. Y. His headquarters will be in Denver.

A. C. Cornell, Rocky Mountain district manager of the Graybar Electric Company and chairman of the Electrical League of Colorado, Denver, has been named a member of the radio interference committee appointed by the City Club of Denver.

J. F. Farquhar, general agent for The Washington Water Power Company, Spokane, recently made a trip to Boise, Idaho, in connection with the filing of new rates.

G. H. Pike, rate engineer, The Washington Water Power Company, Spokane, made a trip to Olympia, Wash., not long ago to file some new rates with the department of public works.

T. G. Aston, claim agent for The Washington Water Power Company, Spokane, lately returned from Olympia, Wash., where he attended the legislative session.

W. E. Durrant, of the Edison Electric Appliance Company, Spokane, has been made district manager of that company for eastern Washington, Oregon and northern Idaho. Mr. Durrant attended the Edison company's convention at its home office in Chicago the forepart of January.

W. J. Dennis, of Portland, assistant general manager of the Northwestern Electric Company, which has taken over the Kalama and Woodland, Wash., and Rainier, Ore., electric systems from the Puget Sound Power & Light Company, a short while ago completed a trip of inspection over the company's new holdings. **E. Snyder,** manager of the Northwestern Electric Company's office at Ridgefield, Wash., has been named district manager for the newly acquired systems.

Walter M. Fagan has joined the Electric Corporation of Los Angeles as general sales manager. In making this connection Mr. Fagan is renewing West Coast contacts which were broken in 1909 when he went East to join the Chicago branch of the Crouse-Hinds Company of Syracuse, N. Y. He left that company in 1915 to become sales manager for the Hughes Electric Heating Company. When that company later merged with the Hotpoint company, Mr. Fagan remained in charge of sales. When the Hotpoint company became a part of the Edison Electric Appliance Company, Mr. Fagan was made national sales manager of the Hotpoint division. He left that position to come West on personal

WALTER M. FAGAN

business and the wonderful promise for the electrical trade on the Coast induced him to accept the offer of the Electric Corporation. Mr. Fagan is a brother of Frank D. Fagan, special representative of the International General Electric Company in Japan.

TRADE NOTES

Wagner Electric Corporation, St. Louis, has issued bulletin 137 describing and illustrating wound-rotor slip-ring polyphase motors.

The Rainier Electric Bake Oven & Equipment Company, Seattle, will move to its new home under construction at 1413-19 Jackson Street. The new plant is 75x96 ft. in size, one-story frame and masonry construction.

Curtis Lighting of California, Inc., San Francisco, has changed its address to 416 Foxcroft Building. It formerly was located at 507 Foxcroft Building.

Packard Electric Company, Warren, Ohio, has issued a two-page leaflet announcing improvements in design of the Packard type K current transformers.

American Electric Fusion Corporation, Chicago, has issued a new folder on electric welding, giving the principles of electric spot, butt and seam welding.

Hobart Brothers Company, Troy, Ohio, is introducing a new feature, known as the HB electrical test bench, which it claims is unusually low priced and has many advantageous features.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, has issued Circular 7378 on Materials Handling that shows the beneficial results to be obtained in the various industries through the use of electrically driven machinery for the handling of materials.

The Mutual Electric & Machine Company, Detroit, manufacturer of "Bull Dog" electrical products, has added a new type of safety fusenter to its line, known as the Type "AF". It is a combination of standard units of high-grade moulded composition blocks, mounted on a steel plate which is adjustable in all directions so as to make it conform to the wall line.

Link-Belt Company, Chicago, has issued a booklet No. 895, containing 48 pages, generously illustrated to show the use of the drag-line, dipper and trench shovel, skimmer scoop, hook blocks and pile drivers and giving other data on its type of crawler. Information on lifting capacities, approximate operating speeds, and line pull and tables in which the data are arranged also are given.

Celite Products Company, Los Angeles, has issued bulletin No. 314, which is now available to those interested in concrete construction. The bulletin is illustrated with photographs and drawings and fully describes the company's products.

The Allen-Bradley Company, Milwaukee, manufacture of electrical controlling apparatus, has published a bulletin on its type C-1220 current-limit automatic direct-current starter for machine tool service or similar applications.

Pacific Electric Manufacturing Company, San Francisco, has issued Bulletin T, which describes its line of high-tension switches.

Ludlum Steel Company, Watervliet, N. Y., has appointed **G. L. Hulben** as a member of the sales force of the Chicago branch of the company.

General Electric Company, Schenectady, describes its line of steam turbines in Bulletin No. GEA-235 recently issued by the company. Illustrations and drawings are given, and construction and operation discussed.

The Cutler-Hammer Manufacturing Company, Milwaukee, has produced a new watertight, acid-resisting, remote-control station. The mechanism is enclosed in a cast-iron case and has a cover fitted with a gasket, which excludes all moisture and fumes.

The Jeffery-Dewitt Insulator Company, Kenova, W. Va., and the **Champion Switch Company,** Buffalo, N. Y., have announced the appointment of **A. F. Krippner** as sales representative for Colorado, with headquarters at Denver.

The Robbins & Myers Company, Springfield, Ohio, has issued a pocket-size fan catalog which covers its complete lines of fans for the season of 1926. The different models are shown in the illustrations and are described fully. Complete price lists are given.

Circle F Manufacturing Company, Trenton, N. J., now is established in its new office building at 720 Monmouth Street.

Alexander & Lavenson Electrical Supply Company, San Francisco, has announced that it will carry a complete line of General Electric wiring devices and other products manufactured by that company.

Simplex Wire & Cable Company, Boston, has opened a branch office in the Union Trust Building, Cleveland, in order to take better care of its steadily increasing volume of business. **W. H. LaMond** will be manager of the new office.

The Okonite Company and **The Okonite-Callender Company, Inc.,** have announced, through their Pacific Coast manager, **J. L. Phillips,** the following changes in their Pacific Coast representation: A new office has been opened in Seattle in the Hoge Building, with **W. R. Hendrey** as special representative. **E. H. Jones** has been appointed special representative of the two companies in the Los Angeles district, with offices in the A. G. Bartlett Building. The San Francisco office, which continues to be headquarters of the Pacific Coast manager, has moved from Room 750 Monadnock Building to Rooms 370-372 in the same building.

Roller-Smith Company, New York, has issued Bulletin No. 200, covering its new device, the type BBT rail bond tester. The bulletin is illustrated and contains a complete price list.

The Ideal Electric & Manufacturing Company, Mansfield, Ohio, describes its line of ideal switchboards and synchronous motor starting panels in their new Bulletin No. 111. Several views of the switchboard are given in the illustrations, and eight points of protection are enumerated.

The George L. Dyer Company, New York City, has moved its offices from 42 Broadway to Murray Hill Building, 285 Madison Avenue, where it will occupy the entire twentieth floor.

Allis-Chalmers Manufacturing Company, Milwaukee, has issued Bulletin No. 1132 relating to roller bearing motors. Two types are illustrated in the folder.

The Beacon Light Company, of 716 South Hill Street, Los Angeles, Calif., has opened a new branch store at 4605 Beverly Boulevard. The new branch is to be in charge of **A. C. Miller,** who has been associated with the company for several years. **R. G. Logue** is president and general manager of the Beacon Light Company.

Harvey Hubbell, Inc., of Bridgeport, Conn., announces a new line of black porcelain convenience outlets with plain faces. The face of this new outlet is smooth, unmarked and highly glazed.

Methuselahs, or what have you! These men represent 392 years of service, an average of nearly 15 years per man. And they are the San Francisco officials, department heads, and salesmen of the newly named Graybar Electric Company. From left to right they are: Top row: Messrs. Crilly, Brunner, Fryklund, Martinez, Thomson, Curry, Simmons, Chapman, Miserez, Case. Middle row—Messrs. Buttner, Johnson, Caven, Crowson, Vorum, Jesse, Holabird, Treat (manager San Francisco house, Western Electric Company), Mathison, Huyck. Lower row—Messrs. Weyand, Neelands, Bray (credit manager), Wallis (Pacific Coast manager), Berry (San Francisco manager), Nicoll (sales manager), Fryer (accountant), Brown (stores manager).